

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY

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CIVIL ACTION NO.

99-52(WALSH)

ENTERED

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on 4-5
WILLIAM T. WALSH, CLERK
By
(Deputy Clerk)

UNITED STATES OF AMERICA

Plaintiff,

v.

C&D Technologies, Inc.
AlliedSignal, Inc. (as
Successor to Prestolite
Batteries, Inc.);
Exide Corporation;
GNB Technologies, Inc. (as
Successor in Interest to
Gould, Inc.);
Johnson Controls, Inc.;
NL Industries, Inc.;

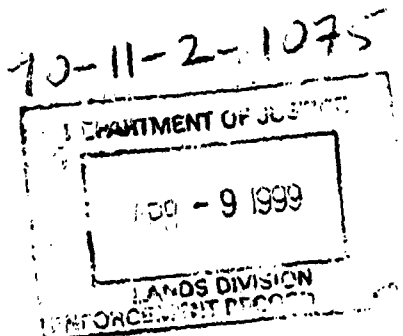
Defendants.

CONSENT DECREE

I. BACKGROUND

A. The United States of America ("United States"), on behalf of the Administrator of the United States Environmental Protection Agency ("EPA"), filed a complaint in this matter pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9606, 9607.

B. The United States in its complaint seeks, inter alia: (1) reimbursement of costs incurred by EPA and the Department of Justice for response actions at the NL Industries, Inc. Superfund



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B. The United States in its complaint seeks, inter alia: (1) reimbursement of costs incurred by EPA and the Department of Justice for response actions at the NL Industries, Inc. Superfund

Site in Pedricktown, Salem County, New Jersey, together with accrued interest; and (2) performance of studies and response work by the defendants at the Site consistent with the National Contingency Plan, 40 C.F.R. Part 300 (as amended) ("NCP").

C. In accordance with the NCP and Section 121(f)(1)(F) of CERCLA, 42 U.S.C. § 9621(f)(1)(F), EPA notified the State of New Jersey (the "State") on January 28, 1998, of negotiations with potentially responsible parties regarding the implementation of the remedial design and remedial action for the Site, and EPA has provided the State with an opportunity to participate in such negotiations and be a party to this Consent Decree.

D. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified the United States Department of Interior and the National Oceanic and Atmospheric Administration, on January 27, 1998, of negotiations with potentially responsible parties regarding the release of hazardous substances that may have resulted in injury to the natural resources under Federal trusteeship and encouraged these trustees to participate in the negotiation of this Consent Decree.

E. The defendants that have entered into this Consent Decree ("Settling Defendants") do not admit any liability to the Plaintiff arising out of the transactions or occurrences alleged in the complaint, nor do they acknowledge that the release or threatened release of hazardous substance(s) at or from the Site constitutes

an imminent or substantial endangerment to the public health or welfare or the environment. The participation of any Settling Defendant in this Consent Decree should not be construed as an admission of liability for any purpose, and the fact of such participation by the Settling Defendant shall not be admissible against such Settling Defendant at any judicial or administrative proceeding, except in an action or proceeding brought by the United States to enforce the terms of this Consent Decree.

F. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register in September, 1983, 48 Fed. Reg. 40666.

G. In response to a release or a substantial threat of a release of a hazardous substance(s) at or from the Site, NL Industries, Inc. commenced, on April 30, 1986, a Remedial Investigation and Feasibility Study ("RI/FS") for the Site pursuant to 40 C.F.R. § 300.430.

H. NL Industries, Inc., completed a Remedial Investigation ("RI") Report in July, 1991, and also completed a Feasibility Study ("FS") Report in July, 1993.

I. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the FS and of the proposed plan for remedial action for Operable Unit Two (addressing slag piles, lead oxide piles, debris, contaminated surfaces, and

standing water and sediments) on July 17, 1991, in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the proposed plan for remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Regional Administrator based the selection of the response action.

J. The decision by EPA on the Operable Unit Two remedial action to be implemented at the Site is embodied in a final Record of Decision ("OU#2 ROD"), executed on September 27, 1991, on which the State had a reasonable opportunity to review and comment and on which the State has given its concurrence. The OU #2 ROD includes EPA's March 1992 Explanation of Significant Differences, which partially modifies the OU #2 ROD to provide for the off-site disposal of the slag and lead-oxide materials at the Site, the proposed plan as well as a responsiveness summary to the public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA.

K. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the FS and of the proposed plan for remedial action for Operable Unit One (addressing ground water, surface water, soils and stream sediment) on July 22, 1993, in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the

proposed plan for remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Regional Administrator based the selection of the response action.

L. The decision by EPA on the Operable Unit One remedial action to be implemented at the Site is embodied in a final Record of Decision ("OU#1 ROD"), executed on July 8, 1994, on which the State had a reasonable opportunity to review and comment and on which the State did not give its concurrence. The OU#1 ROD includes a responsiveness summary to the public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA.

M. On September 15, 1995, EPA issued an Action Memorandum regarding an ongoing removal action at the Site. The Action Memorandum requested a ceiling increase and an increase in scope for the on-going removal action. The on-going removal activities include: sampling in the West Stream and associated flood plain in areas A, B, and C at the Site; implementation of actions to reduce run-off east of the West Stream in area B and from the tributaries to area C from the landfill; removing and disposing of the remaining lead contaminated soil from areas A, B, and C; confirmatory sampling, and; backfilling and grading, as necessary. See Appendices C and E.

N. Based on the information presently available to EPA, EPA believes that the Work will be properly and promptly conducted by

the Settling Defendants if conducted in accordance with the requirements of this Consent Decree and its appendices.

O. Solely for the purposes of Section 113(j) of CERCLA, the Remedial Action selected by the OU#1 ROD and the Work to be performed by the Settling Defendants shall constitute a response action taken or ordered by the President.

P. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith and implementation of this Consent Decree will expedite the cleanup of the Site and will avoid prolonged and complicated litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, it is hereby Ordered, Adjudged, and Decreed:

II. JURISDICTION

This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1345, and 42 U.S.C. §§ 9606, 9607, and 9613(b). This Court also has personal jurisdiction over the Settling Defendants. Solely for the purposes of this Consent Decree and the underlying complaint, Settling Defendants waive all objections and defenses that they may have to jurisdiction of the Court or to venue in this District. Settling Defendants shall not challenge the terms of this Consent Decree or this Court's jurisdiction to enter and enforce this Consent Decree.

III. PARTIES BOUND

1. This Consent Decree applies to and is binding upon the United States and upon Settling Defendants and their heirs, successors and assigns. Any change in ownership or corporate status of a Settling Defendant including, but not limited to, any transfer of assets or real or personal property, shall in no way alter such Settling Defendant's responsibilities under this Consent Decree.

2. Settling Defendants shall provide a copy of this Consent Decree to each contractor hired to perform the Work (as defined below) required by this Consent Decree and to each person representing any Settling Defendant with respect to the Site or the Work and shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Consent Decree. Settling Defendants or their contractors shall provide written notice of the Consent Decree to all subcontractors hired to perform any portion of the Work required by this Consent Decree. Settling Defendants shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work contemplated herein in accordance with this Consent Decree. With regard to the activities undertaken pursuant to this Consent Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with the Settling Defendants within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

IV. DEFINITIONS

3. Unless otherwise expressly provided herein, terms used in this Consent Decree which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

"Action Memorandum" shall mean the Action Memorandum issued by EPA for the Site on September 15, 1995 (See Appendix E).

"CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq.

"Consent Decree" shall mean this Decree and all appendices attached hereto (listed in Section XXIX). In the event of conflict between this Decree and any appendix, this Decree shall control.

"Day" shall mean a calendar day unless expressly stated to be a working day. "Working day" shall mean a day other than a Saturday, Sunday, or Federal holiday. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.

"EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

"NJDEP" shall mean the New Jersey Department of Environmental Protection and any successor departments or agencies of the State.

"Future Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States incurs in reviewing or developing plans, reports and other items pursuant to this Consent Decree, verifying the Work, or otherwise implementing, overseeing, or enforcing this Consent Decree, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Sections VII, IX (including, but not limited to, attorneys fees and any monies paid to secure access and/or to secure institutional controls, including the amount of just compensation), XV, and Paragraph 84 of Section XXI. Future Response Costs shall also include all Interim Response Costs and all Interest on the Past Response Costs that has accrued pursuant to 42 U.S.C. § 9607(a) during the period from December 6, 1997 (for payroll costs) and from December 19, 1997 (for all other costs), to the date of entry of this Consent Decree.

"Institutional Controls" shall mean land and/or water use restrictions which may include, but need not be limited to, restrictions in the form of contractual agreements, deed restrictions, state or local laws, regulations, ordinances or other governmental action.

"Interim Response Costs" shall mean all costs, including direct and indirect costs, (a) paid by the United States in connection with the Site between December 6, 1997, and the effective date of this Consent Decree (for payroll costs) and between December 19, 1997, and the effective date of this Consent Decree (for all other costs), or (b) incurred prior to the effective date of this Consent Decree but paid after that date. "Interim Response Costs" shall not include any other costs, including direct or indirect costs, paid or incurred by the United States in relation to the OU#1 Remedial Design being performed pursuant to the Administrative Order on Consent, In the Matter of NL Industries, Inc., Superfund Site, Index No. II-CERCLA-96-0108 at the Site.

"Interest," shall mean interest at the rate specified for interest on investments of the Hazardous Substance Superfund established under Subchapter A of Chapter 98 of Title 26 of the U.S. Code, compounded on October 1 of each year, in accordance with 42 U.S.C. § 9607(a).

"Matters Addressed" shall mean all response actions taken or to be taken and all response costs incurred or to be incurred by the United States or any other person with respect to this Site. The "Matters Addressed" in this Consent Decree do not include those response costs or response actions as to which the United States has reserved its rights under this Consent Decree (except for claims for failure to comply with this Consent Decree), in the

event that the United States asserts rights against Settling Defendants coming within the scope of such reservations.

"National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

"Operation and Maintenance" or "O & M" shall mean all activities required to maintain the effectiveness of the Remedial Action as required under the Operation and Maintenance Plan approved or developed by EPA pursuant to this Consent Decree and the Statement of Work (SOW).

"Paragraph" shall mean a portion of this Consent Decree identified by an arabic numeral or an upper case letter.

"Parties" shall mean the United States and the Settling Defendants.

"Past Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States paid at or in connection with the Site through December 6, 1997 (for payroll costs) and through December 19, 1997 (for all other costs), plus Interest on all such costs which has accrued pursuant to 42 U.S.C. § 9607(a) through such date. Past Response Costs shall not include those costs which have been or will be paid to the EPA via the RI/FS Administrative Order on Consent, In the Matter of NL Industries, Inc., Index No. II CERCLA-60109. Past Response Costs

shall not include those costs which have been or will be paid to the EPA via the OU#1 Remedial Design Administrative Order on Consent, In the Matter of NL Industries, Inc., Superfund Site, Index No. II CERCLA-96-0108.

"Performance Standards" shall mean the cleanup standards and other measures of achievement of the goals of the Remedial Action, set forth in the OU#1 ROD, and Section E.2 of the SOW, as well as the cleanup standards and other measures of achievement of the goals in the Action Memorandum. Performance Standards shall also mean any Alternate Performance Standards established by EPA pursuant to the provisions of Paragraph 10.

"Plaintiff" shall mean the United States.

"RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 et seq. (also known as the Resource Conservation and Recovery Act).

"Record of Decision" or "OU#1 ROD" shall mean the EPA Record of Decision relating to the Operable Unit One at the Site signed on July 8, 1994, by the Regional Administrator, EPA Region II, or his/her delegate, and all attachments thereto. The OU#1 ROD is attached as Appendix A.

"Remedial Action" shall mean those activities, except for Operation and Maintenance, to be undertaken by the Settling Defendants to implement the OU#1 ROD, in accordance with the SOW

and the final Remedial Design and Remedial Action Work Plans and other plans approved by EPA.

"Remedial Action Work Plan" shall mean the document developed pursuant to Paragraph 9 of this Consent Decree and approved by EPA, and any amendments thereto.

"Remedial Design" shall mean those activities being undertaken by the Settling Defendants to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design Work Plan being undertaken pursuant to In the Matter of NL Industries, Inc., Superfund Site, Administrative Order on Consent (II-CERCLA-96-0108).

"Removal Action" shall mean those activities to be taken by Settling Defendants to implement the activities described in the Action Memorandum, in accordance with the SOW and the final Remedial Design and Remedial Action Work Plans and other plans approved by EPA.

"Section" shall mean a portion of this Consent Decree identified by a roman numeral.

"Settling Defendants" shall mean those Parties identified in Appendix D.

"Site" shall mean the NL Industries, Inc., Superfund Site, encompassing approximately 44 acres, located at Pennsgrove-Pedricktown Road in Pedricktown, Salem County, New Jersey, including the areal extent of contamination and all suitable areas

in very close proximity to the contamination necessary for implementation of the response action--depicted generally on the map attached as Appendix C.

"State" shall mean the State of New Jersey.

"Statement of Work" or "SOW" shall mean the statement of work for implementation of the Remedial Action and Removal Action, and Operation and Maintenance at the Site, as set forth in Appendix B to this Consent Decree and any modifications made in accordance with this Consent Decree.

"Supervising Contractor" shall mean the principal contractor retained by the Settling Defendants to supervise and direct the implementation of the Work under this Consent Decree.

"Supplemental Institutional Controls" shall mean Institutional Controls (other than those which are required pursuant to Section IX., below) that are developed, requested, or approved by EPA for one or more of the following purposes: (1) to ensure non-interference with the performance, operation and maintenance of any response actions at or pertaining to the Site, other than the remedy selected in the ROD; (2) to ensure the integrity and effectiveness of any response actions at or pertaining to the Site, other than the remedy selected in the ROD; and (3) to otherwise ensure the protection of public health, welfare, or the environment at and in connection with the Site.

"United States" shall mean the United States of America.

"Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33), 42 U.S.C. § 9601(33), and; (3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).

"Work" shall mean all activities Settling Defendants are required to perform under this Consent Decree, except those required by Section XXV (Retention of Records), including the securing and implementation of Institutional Controls.

V. GENERAL PROVISIONS

4. Objectives of the Parties

The objectives of the Parties in entering into this Consent Decree are to protect public health or welfare or the environment at the Site by the implementation of a Remedial Action for Operable Unit One and a Removal Action at the Site by the Settling Defendants, to reimburse response costs of the Plaintiff, and to resolve the claims of the Plaintiff against Settling Defendants as provided in this Consent Decree.

5. Commitments by Settling Defendants

a. Settling Defendants shall finance and perform the Work in accordance with this Consent Decree, the OU#1 ROD, the Action Memorandum, the SOW, and all work plans and other plans, standards, specifications, and schedules set forth herein or developed by

Settling Defendants and approved by EPA pursuant to this Consent Decree. Settling Defendants shall also reimburse the United States for Past Response Costs and Future Response Costs as provided in this Consent Decree.

b. The obligations of Settling Defendants to finance and perform the Work and to pay amounts owed the United States under this Consent Decree are joint and several. In the event of the insolvency or other failure of any one or more Settling Defendants to implement the requirements of this Consent Decree, the remaining Settling Defendants shall complete all such requirements.

6. Compliance With Applicable Law

All activities undertaken by Settling Defendants pursuant to this Consent Decree shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. Settling Defendants must also comply with all applicable or relevant and appropriate requirements of all federal and state environmental laws as set forth in the OU#1 ROD, the Action Memorandum, and the SOW. The activities conducted pursuant to this Consent Decree, if approved by EPA, shall be considered to be consistent with the NCP.

7. Permits

a. As provided in Section 121(e) of CERCLA and Section 300.400(e) of the NCP, no permit shall be required for any portion of the Work conducted entirely on-site (i.e., within the areal

extent of contamination or in very close proximity to the contamination and necessary for implementation of the Work), except that work performed on-site must conform with the applicable requirements and standards as if a permit were in place. Where any portion of the Work that is not on-site requires a federal or state permit or approval, Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

b. The Settling Defendants may seek relief under the provisions of Section XVIII (Force Majeure) of this Consent Decree for any delay in the performance of the Work resulting from a failure to obtain, or a delay in obtaining, any permit required for the Work.

c. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

VI. PERFORMANCE OF THE WORK BY SETTLING DEFENDANTS

8. Project Supervision

a. All aspects of the Work to be performed by Settling Defendants pursuant to Sections VI (Performance of the Work by Settling Defendants), VII (Remedy Review), VIII (Quality Assurance, Sampling and Data Analysis), and XV (Emergency Response) of this Consent Decree shall be under the direction and supervision of a qualified licensed professional engineer. Management of all the

Work to be performed pursuant to this Consent Decree shall be the responsibility of the Project Coordinator. The Project Coordinator shall serve as EPA's primary contact on all matters relating to the Work. Within ten (10) calendar days after lodging of this Consent Decree or thirty (30) calendar days of EPA's approval of the Final Remedial Design Report prepared pursuant to the OU#1 Remedial Design Administrative Order on Consent, In the Matter of NL Industries, Inc., Superfund Site, Index No. II CERCLA-96-0108, whichever is later, Settling Defendants shall award a contract for construction of the Remedial Action and Removal Action to an appropriate contractor(s). Within thirty (30) calendar days of award of contract, the Settling Defendants shall submit a Remedial Action Work Plan for Remedial Construction activities to EPA and the State. The Remedial Action Work Plan shall include a Site Management Plan, which shall identify the Project Coordinator, Supervisory Engineer, contractors and subcontractors and their respective responsibilities for construction of the Remedial Action and Removal Action.

b. EPA will either approve, approve with conditions, approve with modifications, or disapprove the Remedial Action Work Plan, in accordance with the procedures set forth in Section XI (EPA Approval Of Plans and Other Submissions) of this Consent Decree.

9. Remedial Action and Removal Action.

a. As provided for in Paragraph 8.a. of this Consent Decree, within ten (10) calendar days after lodging of this Consent Decree or thirty (30) calendar days of EPA's approval of the Final Remedial Design Report prepared pursuant to the OU#1 Remedial Design Administrative Order on Consent, In the Matter of NL Industries, Inc., Superfund Site, Index No. II CERCLA-96-0108, whichever is later, Settling Defendants shall award a contract for construction of the Remedial Action and Removal Action to an appropriate contractor(s). Within thirty (30) calendar days of award of contract, the Settling Defendants shall submit a Remedial Action Work Plan for Remedial Construction activities to EPA and the State. The Remedial Action Work Plan shall provide for the construction of the remedy set forth in the OU#1 ROD and the Action Memorandum, in a manner which will result in the achievement of the Performance Standards, in accordance with this Consent Decree, the OU#1 ROD, the Action Memorandum, the SOW, and the design plans and specifications developed in accordance with the Remedial Design Work Plan and approved by EPA. Upon its approval by EPA, the Remedial Action Work Plan shall be incorporated into and become enforceable under this Consent Decree.

b. The Remedial Action Work Plan shall include the following: (1) Any requests for modification of the approved Remedial Design Report; and (2) The Site Management Plan for

construction of the Remedial Action and Removal Action. The Site Management Plan shall include, at a minimum, the following: (1) identification of off-Site facilities proposed to be used to manage hazardous substances, pollutants, contaminants, or other materials resulting from construction activities; (2) discussion of the methods by which the construction operations shall proceed; (3) discussion of construction quality control; and (4) a Health and Safety Plan for field activities required by the Remedial Action Work Plan which conforms to the applicable Occupational Safety and Health Administration and EPA requirements including, but not limited to, 29 C.F.R. § 1910.120. The Remedial Action Work Plan also shall include a schedule for implementation of all Remedial Action and Removal Action tasks identified in the final design submittal and shall identify the initial formulation of the Settling Defendants' Remedial Action Project Team (including, but not limited to, the Project Coordinator and the Supervising Engineer).

c. Upon approval of the Remedial Action Work Plan by EPA, after a reasonable opportunity for review and comment by the State, Settling Defendants shall implement the activities required under the Remedial Action Work Plan. The Settling Defendants shall submit to EPA and the State all plans, submittals, or other deliverables required under the approved Remedial Action Work Plan in accordance with the approved schedule for review and approval

pursuant to Section XI (EPA Approval of Plans and Other Submissions). Unless otherwise directed by EPA, Settling Defendants shall not commence physical Remedial Action or Removal Action activities at the Site prior to approval of the Remedial Action Work Plan.

10. The Settling Defendants shall continue to implement the Remedial Action, Removal Action, and O&M until all of the Performance Standards are achieved, unless EPA, in its sole discretion, determines that compliance with any of the Performance Standards shall be waived based upon a determination of technical impracticability, and for so long thereafter as is otherwise required under this Consent Decree. If EPA waives compliance with any Performance Standard, based upon a determination of technical impracticability, the Settling Defendants shall be responsible for the attainment of any Alternate Performance Standards established by EPA. The Settling Defendants shall continue O&M of the soil/sediment component of the work (specifically, the landfill to be constructed on the Site), in accordance with the EPA-approved O&M Plan.

11. Modification of the SOW or Related Work Plans.

a. If EPA determines that modification to the work specified in the SOW and/or in work plans developed pursuant to the SOW is necessary to achieve and maintain the Performance Standards or to carry out and maintain the effectiveness of the remedy set

forth in the OU#1 ROD and the Action Memorandum, EPA may require that such modification be incorporated in the SOW and/or such work plans. Provided, however, that a modification may only be required pursuant to this Paragraph to the extent that it is consistent with the scope of the remedy selected in the OU#1 ROD and the Action Memorandum.

b. For the purposes of this Paragraph 11 and Paragraphs 46, 47, and 48 only, the "scope of the remedy selected in the OU#1 ROD" is:

- Excavation of all soils contaminated with lead above the remedial action objective of 500 parts per million (ppm), treatment via solidification/stabilization of those soils classified as hazardous under the Resource Conservation and Recovery Act, and disposal of the treated soils along with non-hazardous soils in a landfill to be constructed on the Site;
- Removal of contaminated stream sediments containing above 500 ppm of lead from the East Stream and drainage channel north of route 130 and treatment/disposal of the sediments in a manner similar to that described for soils above;
- Extraction and treatment of contaminated ground water with direct discharge of the treated ground water to the Delaware River, and;

- Appropriate environmental monitoring to ensure the effectiveness of the remedy.

c. For the purposes of this Paragraph 11 and Paragraphs 46, 47 and 48 only, the "scope of the remedy selected in the...Action Memorandum" is:

- sampling in the West Stream and associated flood plain in areas A, B, and C at the Site;
- implementation of actions to reduce run-off east of the West Stream in area B and from the tributaries to area C from the landfill;
- removing and disposing of the remaining lead contaminated soil from areas A, B, and C;
- confirmatory sampling, and;
- backfilling and grading, as necessary.

d. If Settling Defendants object to any modification determined by EPA to be necessary pursuant to this Paragraph, with the exception of the modification of plans or Performance Standards provided for in Section E.2. (Goals For Aquifer Restoration) of the SOW, they may seek dispute resolution pursuant to Section XIX (Dispute Resolution), Paragraph 65 (record review). The SOW and/or related work plans shall be modified in accordance with final resolution of the dispute.

e. Settling Defendants shall implement any work required by any modifications incorporated in the SOW and/or in work plans developed pursuant to the SOW in accordance with this Paragraph.

f. Nothing in this Paragraph shall be construed to limit EPA's authority to require performance of further response actions as otherwise provided in this Consent Decree.

12. Settling Defendants acknowledge and agree that nothing in this Consent Decree, the SOW, or the Remedial Design or Remedial Action Work Plans constitutes a warranty or representation of any kind by Plaintiff that compliance with the work requirements set forth in the SOW and the Work Plans will achieve the Performance Standards.

13. Settling Defendants shall, prior to any off-Site shipment of Waste Material from the Site to an out-of-state waste management facility, provide written notification to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator of such shipment of Waste Material. However, this notification requirement shall not apply to any off-Site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

a. The Settling Defendants shall include in the written notification the following information, where available: (1) the name and location of the facility to which the Waste Material are to be shipped; (2) the type and quantity of the Waste Material to

be shipped; (3) the expected schedule for the shipment of the Waste Material; and (4) the method of transportation. The Settling Defendants shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

b. The identity of the receiving facility and state will be determined by the Settling Defendants following the award of the contract for Remedial Action and Removal Action construction. The Settling Defendants shall provide the information required by Paragraph 13.a as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

VII. REMEDY REVIEW

14. Periodic Review. Settling Defendants shall conduct any studies and investigations as requested by EPA, in order to permit EPA to conduct reviews of whether the Remedial Action is protective of human health and the environment at least every five years as required by Section 121(c) of CERCLA and any applicable regulations.

15. EPA Selection of Further Response Actions. If EPA determines, at any time, that the Remedial Action or Removal Action is not protective of human health and the environment, EPA may select further response actions for the Site in accordance with the requirements of CERCLA and the NCP.

16. Opportunity To Comment. Settling Defendants, and if required by Sections 113(k)(2) or 117 of CERCLA, the public, will be provided with an opportunity to comment on any further response actions proposed by EPA as a result of the review conducted pursuant to Section 121(c) of CERCLA and to submit written comments for the record during the comment period.

17. Settling Defendants' Obligation To Perform Further Response Actions. If EPA selects further response actions for the Site, the Settling Defendants shall undertake such further response actions to the extent that the reopener conditions in Paragraph 80 or Paragraph 81 (United States' reservations of liability based on unknown conditions or new information) are satisfied. Settling Defendants may invoke the procedures set forth in Section XIX (Dispute Resolution) to dispute (1) EPA's determination that the reopener conditions of Paragraph 80 or Paragraph 81 of Section XXI (Covenants Not To Sue by Plaintiffs) are satisfied, (2) EPA's determination that the Remedial Action is not protective of human health and the environment, or (3) EPA's selection of the further response actions. Disputes pertaining to whether the Remedial Action is protective or to EPA's selection of further response actions shall be resolved pursuant to Paragraph 65 (record review).

18. Submissions of Plans. If Settling Defendants are required to perform the further response actions pursuant to Paragraph 17, they shall submit a plan for such work to EPA for approval in

accordance with the procedures set forth in Section VI (Performance of the Work by Settling Defendants) and shall implement the plan approved by EPA in accordance with the provisions of this Decree.

VIII. QUALITY ASSURANCE, SAMPLING, and DATA ANALYSIS

19. Settling Defendants shall use quality assurance, quality control, and chain of custody procedures for all samples in accordance with "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operation," (EPA QA/R5); "Preparing Perfect Project Plans," (EPA /600/9-88/087), the "Region II CERCLA Quality Assurance Manual," dated October 1989, and subsequent amendments to such guidelines upon notification by EPA to Settling Defendants of such amendment. Amended guidelines shall apply only to procedures conducted after such notification. Prior to the commencement of any monitoring project under this Consent Decree, Settling Defendants shall submit to EPA for approval, after a reasonable opportunity for review and comment by the State, a Quality Assurance Project Plan ("QAPP") that is consistent with the SOW, the NCP and applicable guidance documents. If relevant to the proceeding, the Parties agree that validated sampling data generated in accordance with the QAPP(s) and reviewed and approved by EPA shall be admissible as evidence, without objection, in any proceeding under this Decree. Settling Defendants shall ensure that EPA personnel and its authorized representatives are allowed access at reasonable times to all laboratories utilized by Settling

Defendants in implementing this Consent Decree. In addition, Settling Defendants shall ensure that such laboratories shall analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring. Settling Defendants shall ensure that the laboratories they utilize for the analysis of samples taken pursuant to this Decree perform all analyses according to accepted EPA methods. Accepted EPA methods consist of those methods which are documented in the "Contract Lab Program Statement of Work for Inorganic Analysis" and the "Contract Lab Program Statement of Work for Organic Analysis," dated March 1990, and any amendments made thereto during the course of the implementation of this Decree. Settling Defendants shall ensure that all laboratories they use for analysis of samples taken pursuant to this Consent Decree participate in an EPA or EPA-equivalent QA/QC program. Settling Defendants shall ensure that all field methodologies utilized in collecting samples for subsequent analysis pursuant to this Decree will be conducted in accordance with the procedures set forth in the QAPP approved by EPA.

20. Upon request, the Settling Defendants shall allow split or duplicate samples to be taken by EPA or its authorized representatives. Settling Defendants shall notify EPA not less than 28 days in advance of any sample collection activity unless shorter notice is agreed to by EPA. In addition, EPA shall have the right to take any additional samples that EPA deems necessary.

Upon request, EPA shall allow the Settling Defendants to take split or duplicate samples of any samples it takes as part of the Plaintiff's oversight of the Settling Defendants' implementation of the Work.

21. Settling Defendants shall submit to EPA 5 copies of the results of all sampling and/or tests or other data obtained or generated by or on behalf of Settling Defendants with respect to the Site and/or the implementation of this Consent Decree unless EPA agrees otherwise.

22. Notwithstanding any provision of this Consent Decree, the United States hereby retains all of its information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA and any other applicable statutes or regulations.

IX. ACCESS AND INSTITUTIONAL CONTROLS

23. If the Site, or any other property where access and/or land/water use restrictions are needed to implement this Consent Decree, is owned or controlled by any of the Settling Defendants, such Settling Defendants shall:

a. commencing on the date of lodging of this Consent Decree, provide the United States and its representatives, including EPA and its contractors, with access at all reasonable times to the Site, or such other property, for the purpose of

conducting any activity related to this Consent Decree including, but not limited to, the following activities:

- i. Monitoring the Work;
- ii. Verifying any data or information submitted to the United States;
- iii. Conducting investigations relating to contamination at or near the Site;
- iv. Obtaining samples;
- v. Assessing the need for, planning, or implementing additional response actions at or near the Site;
- vi. Implementing the Work pursuant to the conditions set forth in Paragraph 84 of this Consent Decree;
- vii. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Settling Defendants or their agents, consistent with Section XXIV (Access to Information);
- viii. Assessing Settling Defendants' compliance with this Consent Decree; and

ix. Determining whether the Site or other property is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted, by or pursuant to this Consent Decree;

b. commencing on the date of lodging of this Consent Decree, refrain from using the Site, or such other property, in any manner that would interfere with or adversely affect the integrity or protectiveness of the remedial measures to be implemented pursuant to this Consent Decree. For example, Settling Defendants shall abide by the following land and/or water use restrictions, which shall function to prevent the use of groundwater beneath the Site, exposure to lead-contaminated soil, and damage to the landfill to be constructed at the Site:

i. Soil excavation, including landscaping and surficial regrading, shall not be conducted without prior EPA approval;

ii. Groundwater beneath the Site shall not be withdrawn for any purpose without prior EPA approval. Further, groundwater supply wells shall not be installed or utilized at the Site without prior EPA approval;

iii. No use or activity shall be permitted at the Site which will interfere with remedial measures to be

implemented in accordance with this Consent Decree, including the extraction, treatment and discharge of groundwater and the excavation solidification/stabilization of hazardous soil and sediment; and

iv. No use or activity shall be permitted at the Site which will interfere with remedial measures to be implemented in accordance with this Consent Decree, including the on-Site landfilling of contaminated soil and sediment; the construction and maintenance of an on-Site landfill; and environmental monitoring.

c. if EPA so requests, execute and record in the Recorder's Office or Registry of Deeds or other appropriate land records office of Salem County, State of New Jersey, an easement, running with the land, that (i) grants a right of access for the purpose of conducting any activity related to this Consent Decree including, but not limited to, those activities listed in Paragraph 23.a of this Consent Decree, and (ii) grants the right to enforce the land/water use restrictions listed in Paragraph 23.b. of this Consent Decree, or other restrictions that EPA determines are necessary to implement, ensure non-interference with, or ensure the protectiveness of the remedial measures to be performed pursuant to this Consent Decree. Such Settling Defendants shall grant the access rights and the rights to enforce the land/water use

restrictions to one of more of the following persons, as determined by EPA: (i) the United States, on behalf of EPA, and its representatives, (ii) the State and its representatives, (iii) the other Settling defendants and their representatives, and/or (iv) other appropriate grantees. Such Settling Defendants shall, within 45 days of EPA's request, submit to EPA for review and approval with respect to such property:

i. A draft easement, in substantially the form attached hereto as Appendix F, that is enforceable under the laws of the State of New Jersey, free and clear of all prior liens and encumbrances (except as approved by EPA), and acceptable under the Attorney General's Title Regulations promulgated pursuant to 40 U.S.C. § 255; and

ii. a current title commitment or report prepared in accordance with the U.S. Department of Justice Standards for the Preparation of Title Evidence in Land Acquisitions by the United States (1970) (the "Standards").

Within 15 days of EPA's approval and acceptance of the easement, such Settling Defendants shall update the title search and, if it is determined that nothing has occurred since the effective date of the commitment or report to affect the title adversely, record the

easement with the Recorder's Office or Registry of Deeds or other appropriate office of Salem County. Within 30 days of recording the easement, such Settling Defendants shall provide EPA with final title evidence acceptable under the Standards, and a certified copy of the original recorded easement showing the clerk's recording stamps.

24. If the Site, or any other property where access and/or land/water use restrictions are needed to implement this Consent Decree, is owned or controlled by persons other than any of the Settling Defendants, Settling Defendants shall use best efforts to secure from such persons:

a. an agreement to provide access thereto for Settling Defendants, as well as for the United States on behalf of EPA, and the State, as well as their representatives (including contractors), for the purpose of conducting any activity related to this Consent Decree including, but not limited to, those activities listed in Paragraph 23.a of this Consent Decree;

b. an agreement, enforceable by the Settling Defendants and the United States, to abide by the obligations and restrictions established by Paragraph 23.b of this Consent Decree, or that are otherwise necessary to implement, ensure non-interference with, or

ensure the protectiveness of the remedial measures to be performed pursuant to this Consent Decree; and

c. If EPA requests, the execution and recordation in the Recorder's Office or Registry of Deeds or other appropriate land records office of Salem County, State of New Jersey, of an easement, running with the land, that (i) grants a right of access for the purpose of conducting any activity related to this Consent Decree including, but not limited to, those activities listed in Paragraph 23.a of this Consent Decree, and (ii) grants the right to enforce the land/water use restrictions listed in Paragraph 23.b of this Consent Decree, or other restrictions that EPA determines are necessary to implement, ensure non-interference with, or ensure the protectiveness of the remedial measures to be performed pursuant to this Consent Decree.

The access rights and/or rights to enforce land/water use restrictions shall be granted to one or more of the following persons, as determined by EPA: (i) the United States, on behalf of EPA, and its representatives, (ii) the State and its representatives, (iii) the other Settling defendants and their representatives, and/or (iv) other appropriate grantees. Within 45 days of EPA's Settling Defendants shall submit to EPA for review and approval with respect to such property:

i. A draft easement, in substantially the form attached hereto as Appendix F, that is enforceable under the laws of the State of New Jersey, free and clear of all prior liens and encumbrances (except as approved by EPA), and acceptable under the Attorney General's Title Regulations promulgated pursuant to 40 U.S.C. § 255; and

ii. a current title commitment or report prepared in accordance with the U.S. Department of Justice Standards for the Preparation of Title Evidence in Land Acquisitions by the United States (1970) (the "Standards").

Within 15 days of EPA's approval and acceptance of the easement, Settling Defendants shall update the title search and, if it is determined that nothing has occurred since the effective date of the commitment or report to affect the title adversely, the easement shall be recorded with the Recorder's Office or Registry of Deeds or other appropriate office of Salem County. Within 30 days of the recording of the easement, Settling Defendants shall provide EPA with final title evidence acceptable under the Standards, and a certified copy of the original recorded easement showing the clerk's recording stamps.

25. For purposes of Paragraph 24 of this Consent Decree, "best efforts" includes the payment of reasonable sums of money in consideration of access, access easements, land/water use restrictions, and/or restrictive easements. If any access or land/water use restriction agreements required by Paragraphs 24.a or 24.b of this Consent Decree are not obtained within 45 days of the date of entry of this Consent Decree, or any access easements or restrictive easements required by Paragraph 24.c of this Consent Decree are not submitted to EPA in draft form within 45 days of the date of EPA's request, Settling Defendants shall promptly notify the United States in writing, and shall include in that notification a summary of the steps that Settling Defendants have taken to attempt to comply with Paragraph 24 of this Consent Decree, including any steps taken by Settling Defendants prior to the entry of this Consent Decree. The United States may, as it deems appropriate, assist Settling Defendants in obtaining access or land/water use restrictions, either in the form of contractual agreements or in the form of easements running with the land. Settling Defendants shall reimburse the United States in accordance with the procedures in Section XVI (Reimbursement of Response Costs), for all costs incurred by the United States in obtaining such access and/or land/water use restrictions including, but not

limited to, the cost of attorney time and the amount of monetary consideration paid.

26. If EPA determines that land/water use restrictions in the form of state or local laws, regulations, ordinances or other governmental controls are needed to implement the remedy selected in the ROD, ensure the integrity and protectiveness thereof, or ensure non-interference therewith, Settling Defendants shall cooperate with EPA's and the State's efforts to secure such governmental controls.

27. Notwithstanding any provision of this Consent Decree, the United States retains all of its access authorities and rights, as well as all of its rights to require land/water use restrictions, including enforcement authorities related thereto, under CERCLA, RCRA and any other applicable statute or regulations.

X. REPORTING REQUIREMENTS

28. In addition to any other requirement of this Consent Decree, Settling Defendants shall submit to EPA and the State 3 copies of written monthly progress reports that: (a) describe the actions which have been taken toward achieving compliance with this Consent Decree during the previous month; (b) include a summary of all results of sampling and tests and all other data received or generated by Settling Defendants or their contractors or agents in

the previous month; (c) identify all work plans, plans and other deliverables required by this Consent Decree completed and submitted during the previous month; (d) describe all actions, including, but not limited to, data collection and implementation of work plans, which are scheduled for the next six weeks and provide other information relating to the progress of construction, including, but not limited to, critical path diagrams, Gantt charts and Pert charts; (e) include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays; (f) include any modifications to the work plans or other schedules that Settling Defendants have proposed to EPA or that have been approved by EPA; and (g) describe all activities undertaken in support of the Community Relations Plan during the previous month and those to be undertaken in the next six weeks. Settling Defendants shall submit these progress reports to EPA and the State by the tenth day of every month following the lodging of this Consent Decree until EPA notifies the Settling Defendants pursuant to Paragraph 48.b of Section XIV ("Certification of Completion of the Work"). If requested by EPA, Settling Defendants shall also provide briefings for EPA to discuss the progress of the Work.

29. The Settling Defendants shall notify EPA of any change in the schedule described in the monthly progress report for the performance of any activity, including, but not limited to, data collection and implementation of work plans, no later than seven days prior to the performance of the activity.

30. Upon the occurrence of any event during performance of the Work that Settling Defendants are required to report pursuant to Section 103 of CERCLA or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), Settling Defendants shall within 24 hours of the onset of such event orally notify the EPA Project Coordinator or the Alternate EPA Project Coordinator (in the event of the unavailability of the EPA Project Coordinator), or, in the event that neither the EPA Project Coordinator or Alternate EPA Project Coordinator is available, the Chief of the New Jersey Remediation Branch, Emergency and Remedial Response Division, Region II, United States Environmental Protection Agency. If none of these persons are available, Settling Defendants shall notify the EPA Region II Emergency 24-hour Hot Line, at (732) 548-8730 and the National Response Center at (800) 424-8802. These reporting requirements are in addition to the reporting required by CERCLA Section 103 or EPCRA Section 304.

31. Within 20 days of the onset of such an event, Settling Defendants shall furnish to Plaintiff a written report, signed by the Settling Defendants' Project Coordinator, setting forth the

events which occurred and the measures taken, and to be taken, in response thereto. Within 30 days of the conclusion of such an event, Settling Defendants shall submit a report setting forth all actions taken in response thereto.

32. Settling Defendants shall submit 10 copies of all plans, reports, and data required by the SOW, the Remedial Action Work Plan, or any other approved plans to EPA in accordance with the schedules set forth in such plans. Settling Defendants shall simultaneously submit 3 copies of all such plans, reports and data to the State.

33. All reports and other documents submitted by Settling Defendants to EPA (other than the monthly progress reports referred to above) which purport to document Settling Defendants' compliance with the terms of this Consent Decree shall be signed by an authorized representative of the Settling Defendants.

XI. EPA APPROVAL OF PLANS AND OTHER SUBMISSIONS

34. After review of any plan, report or other item which is required to be submitted for approval pursuant to this Consent Decree, EPA, after reasonable opportunity for review and comment by the State, shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that the Settling Defendants modify the submission; or (e) any combination of the above.

However, EPA shall not modify a submission without first providing Settling Defendants at least one notice of deficiency and an opportunity to cure within 14 days, except where to do so would cause serious disruption to the Work or where previous submission(s) have been disapproved due to material defects and the deficiencies in the submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

35. In the event of approval, approval upon conditions, or modification by EPA, pursuant to Paragraph 34(a), (b), or (c), Settling Defendants shall proceed to take any action required by the plan, report, or other item, as approved or modified by EPA subject only to their right to invoke the Dispute Resolution procedures set forth in Section XIX (Dispute Resolution) with respect to the modifications or conditions made by EPA. In the event that EPA modifies the submission to cure the deficiencies pursuant to Paragraph 34(c) and the submission has a material defect, EPA retains its right to seek stipulated penalties, as provided in Section XX (Stipulated Penalties).

36. a. Upon receipt of a notice of disapproval pursuant to Paragraph 34(d), Settling Defendants shall, within 14 days or such longer time as specified by EPA in such notice, correct the deficiencies and resubmit the plan, report, or other item for approval. Any stipulated penalties applicable to the submission, as provided in Section XX, shall accrue during the 14-day period or

otherwise specified period but shall not be payable unless the resubmission is disapproved or modified due to a material defect as provided in Paragraph 38.

b. Notwithstanding the receipt of a notice of disapproval pursuant to Paragraph 34(d), Settling Defendants shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission. Implementation of any non-deficient portion of a submission shall not relieve Settling Defendants of any liability for stipulated penalties under Section XX (Stipulated Penalties).

37. In the event that a resubmitted plan, report or other item, or portion thereof, is disapproved by EPA, EPA may again require the Settling Defendants to correct the deficiencies, in accordance with the preceding Paragraphs. EPA also retains the right to modify or develop the plan, report or other item. Settling Defendants shall implement any such plan, report, or item as modified or developed by EPA, subject only to their right to invoke the procedures set forth in Section XIX (Dispute Resolution).

38. If upon resubmission, a plan, report, or item is disapproved or modified by EPA due to a material defect, Settling Defendants shall be deemed to have failed to submit such plan, report, or item timely and adequately unless the Settling Defendants invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution) and EPA's action is overturned

pursuant to that Section. The provisions of Section XIX (Dispute Resolution) and Section XX (Stipulated Penalties) shall govern the implementation of the Work and accrual and payment of any stipulated penalties during Dispute Resolution. If EPA's disapproval or modification is upheld, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XX.

39. All plans, reports, and other items required to be submitted to EPA under this Consent Decree shall, upon approval or modification by EPA, be enforceable under this Consent Decree. In the event EPA approves or modifies a portion of a plan, report, or other item required to be submitted to EPA under this Consent Decree, the approved or modified portion shall be enforceable under this Consent Decree.

XII. PROJECT COORDINATORS

40. Within 40 days of lodging this Consent Decree or 60 days of EPA's approval of the Final RD Report, whichever is later, Settling Defendants and EPA will notify each other, in writing, of the name, address and telephone number of their respective designated Project Coordinators and Alternate Project Coordinators. If a Project Coordinator or Alternate Project Coordinator initially designated is changed, the identity of the successor will be given to the other Parties at least 5 working days before the changes occur, unless impracticable, but in no event later than the actual

day the change is made. The Settling Defendants' Project Coordinator shall be subject to disapproval by EPA and shall have the technical expertise sufficient to adequately oversee all aspects of the Work. The Settling Defendants' Project Coordinator shall not be an attorney for any of the Settling Defendants in this matter. He or she may assign other representatives, including other contractors, to serve as a Site representative for oversight of performance of daily operations during remedial activities.

41. Plaintiff may designate other representatives including, but not limited to, EPA employees, federal contractors, and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree. EPA's Project Coordinator and Alternate Project Coordinator shall have the authority lawfully vested in a Remedial Project Manager (RPM) and an On-Scene Coordinator (OSC) by the National Contingency Plan, 40 C.F.R. Part 300. In addition, EPA's Project Coordinator or Alternate Project Coordinator shall have authority, consistent with the National Contingency Plan, to halt any Work required by this Consent Decree and to take any necessary response action when s/he determines that conditions at the Site constitute an emergency situation or may present an immediate threat to public health or welfare or the environment due to release or threatened release of Waste Material.

XIII. ASSURANCE OF ABILITY TO COMPLETE WORK

42. Within 30 days of entry of this Consent Decree, Settling Defendants shall establish and maintain financial security in the amount of \$ 21,220,350.00 in one or more of the following forms:

- (a) A surety bond guaranteeing performance of the Work;
- (b) One or more irrevocable letters of credit equaling the total estimated cost of the Work;
- (c) A trust fund;
- (d) A guarantee to perform the Work by one or more parent corporations or subsidiaries, or by one or more unrelated corporations that have a substantial business relationship with at least one of the Settling Defendants, or;
- (e) A demonstration that one or more of the Settling Defendants satisfy the requirements of 40 C.F.R. Part 264.143(f).

43. If the Settling Defendants seek to demonstrate the ability to complete the Work through a guarantee by a third party pursuant to Paragraph 42(d) of this Consent Decree, Settling Defendants shall demonstrate that the guarantor satisfies the requirements of 40 C.F.R. Part 264.143(f). If Settling Defendants seek to demonstrate their ability to complete the Work by means of the financial test or the corporate guarantee pursuant to Paragraph 42(d) or (e), they shall resubmit sworn statements conveying the

information required by 40 C.F.R. Part 264.143(f) annually, on the anniversary of the effective date of this Consent Decree. In the event that EPA determines at any time that the financial assurances provided pursuant to this Section are inadequate, Settling Defendants shall, within 30 days of receipt of notice of EPA's determination, obtain and present to EPA for approval one of the other forms of financial assurance listed in Paragraph 42 of this Consent Decree. Settling Defendants' inability to demonstrate financial ability to complete the Work shall not excuse performance of any activities required under this Consent Decree.

44. If Settling Defendants can show that the estimated cost to complete the remaining Work has diminished below the amount set forth in Paragraph 42 after entry of this Consent Decree, Settling Defendants may, on any anniversary date of entry of this Consent Decree, or at any other time agreed to by the Parties, reduce the amount of the financial security provided under this Section to the estimated cost of the remaining work to be performed. Settling Defendants shall submit a proposal for such reduction to EPA, in accordance with the requirements of this Section, and may reduce the amount of the security upon approval by EPA. In the event of a dispute, Settling Defendants may reduce the amount of the security in accordance with the final administrative or judicial decision resolving the dispute.

45. Settling Defendants may change the form of financial assurance provided under this Section at any time, upon notice to and approval by EPA, provided that the new form of assurance meets the requirements of this Section. In the event of a dispute, Settling Defendants may change the form of the financial assurance only in accordance with the final administrative or judicial decision resolving the dispute.

XIV. CERTIFICATION OF COMPLETION

46. Completion of Construction of the Soil/Sediment Component of the Work and the Groundwater Component of the Work

a. Within 14 days after Settling Defendants conclude that the soil/sediment component of the Work (excluding O & M and post-remediation monitoring) or the groundwater component of the Work (excluding O & M and post-remediation monitoring) has been fully constructed, Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants and EPA. If, after the pre-certification inspection, the Settling Defendants still believe that construction of the soil/sediment component of the Work (excluding O & M and post-remediation monitoring) or the groundwater component of the Work (excluding O & M and post-remediation monitoring) has been completed, and EPA believes that construction of the soil/sediment component of the Work (excluding O & M and post-remediation monitoring) or the groundwater component of the Work (excluding O & M and post-

remediation monitoring) is complete, the Settling Defendants shall submit a written report requesting certification to EPA for approval, with a copy to the State, pursuant to Section XI (EPA Approval of Plans and Other Submissions) within 60 days of the inspection. In the report, a registered professional engineer and the Settling Defendants' Project Coordinator shall state that construction of the soil/sediment component of the Work (excluding O & M and post-remediation monitoring) or the groundwater component of the Work (excluding O & M and post-remediation monitoring) has been completed in full satisfaction of the requirements of this Consent Decree. The written report shall include as-built drawings signed and stamped by a professional engineer. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If, after completion of the pre-certification inspection and receipt and review of the written report, EPA, after reasonable opportunity to review and comment by the State, determines that construction of the soil/sediment component of the Work (excluding O & M and post-remediation monitoring), or any portion thereof, or the groundwater component of the Work (excluding O & M and post-

remediation monitoring), or any portion thereof, has not been completed in accordance with this Consent Decree, EPA will notify Settling Defendants in writing of the activities that must be undertaken by Settling Defendants pursuant to this Consent Decree to complete construction of the soil/sediment component of the Work (excluding O & M and post-remediation monitoring) or the groundwater component of the Work (excluding O & M and post-remediation monitoring). Provided, however, that EPA may only require Settling Defendants to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy selected in the OU#1 ROD," and within the "scope of the...Action Memorandum" as those terms are defined in Paragraph 11. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for approval pursuant to Section XI (EPA Approval of Plans and Other Submissions). Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established pursuant to this Paragraph, subject to their right to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent report requesting Certification of Completion and after a reasonable opportunity for review and comment by the State, that

construction of the soil/sediment component of the Work (excluding O & M and post-remediation monitoring) or the groundwater component of the Work (excluding O & M and post-remediation monitoring) has been performed in accordance with this Consent Decree, EPA will so notify the Settling Defendants in writing.

47. Completion of the Remedial Action and Removal Action

a. Within 90 days after Settling Defendants conclude that the Remedial Action and Removal Action (including O & M of the groundwater component of the Work and Post-Remediation Monitoring, and excluding O& M of the soil/sediment component of the Work) have been fully performed, and that all Performance Standards have been achieved, Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants and EPA. If, after the pre-certification inspection, the Settling Defendants still believe that the Remedial Action and Removal Action have been fully performed, and that all Performance Standards have been achieved, Settling Defendants shall submit a written report by a registered professional engineer stating that the Remedial Action and Removal Action have been completed in full satisfaction of the requirements of this Consent Decree to EPA and the State within 30 days of the inspection. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If, after review of the written report, EPA, after reasonable opportunity to review and comment by the State, determines that any portion of the Remedial Action and Removal Action has not been completed in accordance with this Consent Decree, EPA will notify Settling Defendants in writing of the activities that must be undertaken by Settling Defendants pursuant to this Consent Decree to complete the Remedial Action and Removal Action. Provided, however, that EPA may only require Settling Defendants to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy selected in the OU#1 ROD," and the "scope of the removal as defined...in the Action Memorandum" as those terms are defined in Paragraph 11. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for approval pursuant to Section XI (EPA Approval of Plans and Other Submissions). Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established therein, subject to their right to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent request for Certification of Completion of the Remedial Action and Removal Action by Settling Defendants and after a reasonable opportunity for review and comment by the State, that the Remedial Action and Removal Action have been performed in accordance with this Consent Decree, EPA will so notify the Settling Defendants in writing. This certification shall constitute the Certification of Completion of the Remedial Action and Removal Action for purposes of this Consent Decree, including, but not limited to, Section XXI (Covenants Not to Sue by Plaintiff). Certification of Completion of the Remedial Action and the Removal Action shall not affect Settling Defendants' obligations under this Consent Decree.

48. Completion of the Work

a. Within 90 days after Settling Defendants conclude that all phases of the Work (including O & M of the landfill), have been fully performed, Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants and EPA. If, after the pre-certification inspection, the Settling Defendants still believe that the Work has been fully performed, Settling Defendants shall submit a written report by a registered professional engineer stating that the Work has been completed in full satisfaction of the requirements of this Consent Decree. The report shall contain the following statement, signed by a

responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If, after review of the written report, EPA, after reasonable opportunity to review and comment by the State, determines that any portion of the Work has not been completed in accordance with this Consent Decree, EPA will notify Settling Defendants in writing of the activities that must be undertaken by Settling Defendants pursuant to this Consent Decree to complete the Work. Provided, however, that EPA may only require Settling Defendants to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy selected in the OU#1 ROD," and the "scope of the removal as defined...in the Action Memorandum" as those terms are defined in Paragraph 11. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for approval pursuant to Section XI (EPA Approval of Plans and Other Submissions). Settling Defendants shall perform all activities

described in the notice in accordance with the specifications and schedules established therein, subject to their right to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent request for Certification of Completion of the Work by Settling Defendants and after a reasonable opportunity for review and comment by the State, that the Work has been performed in accordance with this Consent Decree, EPA will so notify the Settling Defendants in writing.

XV. EMERGENCY RESPONSE

49. In the event of any action or occurrence during the performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Settling Defendants shall, subject to Paragraph 50, immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall immediately notify the EPA's Project Coordinator, or, if the Project Coordinator is unavailable, EPA's Alternate Project Coordinator. If neither of these persons is available, the Settling Defendants shall notify the Chief of the New Jersey Remediation Branch, Emergency and Remedial Response Division, Region II. If none of these persons is available, Settling

Defendants shall notify the EPA Region II Emergency 24-hour Hot Line, at (732) 548-8730 and the National Response Center at (800) 424-8802. Settling Defendants shall take such actions in consultation with EPA's Project Coordinator or other available authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plans, the Contingency Plans, and any other applicable plans or documents developed pursuant to the SOW. In the event that Settling Defendants fail to take appropriate response action as required by this Section, and EPA takes such action instead, Settling Defendants shall reimburse EPA all costs of the response action not inconsistent with the NCP pursuant to Section XVI (Reimbursement of Response Costs).

50. Nothing in the preceding Paragraph or in this Consent Decree shall be deemed to limit any authority of the United States a) to take all appropriate action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site, or b) to direct or order such action, or seek an order from the Court, to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site, subject to Section XXI (Covenants Not to Sue by Plaintiff).

XVI. REIMBURSEMENT OF RESPONSE COSTS

51. Within 30 days of the effective date of this Consent Decree, Settling Defendants shall: pay to the United States \$1,515,064.07, in reimbursement of Past Response Costs, via electronic funds transfer ("EFT"). Payment shall be remitted via EFT to Mellon Bank, Pittsburgh, Pennsylvania, as follows:

To make payment via EFT, Settling Defendants shall provide the following information to their bank:

- a. Amount of payment;
- b. Title of Mellon Bank account to receive the payment:
EPA;
- c. Account code for Mellon Bank account receiving the
payment: 9108544;
- d. Mellon Bank ABA Routing Number: 043000261;
- e. Name of Respondent;
- f. Case number;
- g. Site/Spill Identifier Number: 02-61

Along with this information, Settling Defendants shall instruct their bank to remit payment in the agreed upon amount via EFT to EPA's account with Mellon Bank. To ensure that your payment is properly recorded, you should send a letter, within one week of the EFT, which references the date of the EFT, the payment amount, the name of the Site, the case number (02-61) and your name and address

to the United States as specified in Section XXVI (Notices and Submissions) and to the following:

Richard Caspe, Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II
290 Broadway, 19th Floor
New York, New York, 10007-1866

as well as to:

Ronald Gherardi, Chief
Financial Management Branch
Office of Policy and Management
U.S. EPA Region II
290 Broadway, 29th Floor
New York, New York, 10007-1866.

52. Settling Defendants shall reimburse the EPA Hazardous Substance Superfund for all Future Response Costs not inconsistent with the National Contingency Plan. The United States will send Settling Defendants a bill requiring payment that includes a SCORE\$ Report and a DOJ-prepared cost summary reflecting costs incurred by DOJ and its contractors, if any, on a periodic basis. Settling Defendants shall make all payments within 30 days of Settling Defendants' receipt of each bill requiring payment, except as otherwise provided in Paragraph 53, via electronic funds transfer ("EFT"). Payment shall be remitted via EFT to Mellon Bank, Pittsburgh, Pennsylvania, as follows:

To make payment via EFT, Settling Defendants shall provide the following information to their bank:

- a. Amount of payment;
- b. Title of Mellon Bank account to receive the payment:
EPA;
- c. Account code for Mellon Bank account receiving the
payment: 9108544;
- d. Mellon Bank ABA Routing Number: 043000261;
- e. Name of Respondent;
- f. Case number;
- g. Site/Spill Identifier Number: 02-61

Along with this information, Settling Defendants shall instruct their bank to remit payment in the agreed upon amount via EFT to EPA's account with Mellon Bank. To ensure that your payment is properly recorded, you should send a letter, within one week of the EFT, which references the date of the EFT, the payment amount, the name of the Site, the case number (02-61) and your name and address to the United States as specified in Section XXVI (Notices and Submissions) and to the following:

Richard Caspe, Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II
290 Broadway, 19th Floor
New York, New York, 10007-1866

as well as to:

Ronald Gherardi, Chief
Financial Management Branch
Office of Policy and Management
U.S. EPA Region II
290 Broadway, 29th Floor
New York, New York, 10007-1866.

53. Settling Defendants may contest payment of any Future Response Costs under Paragraph 52 if they determine that the United States has made an accounting error or if they allege that a cost item that is included represents costs inconsistent with the NCP. Such objection shall be made in writing within 30 days of receipt of the bill and must be sent to the United States pursuant to Section XXVI (Notices and Submissions). Any such objection shall specifically identify the contested Future Response Costs and the basis for objection. In the event of an objection, the Settling Defendants shall within the 30 day period pay all uncontested Future Response Costs to the United States in the manner described in Paragraph 52. Simultaneously, the Settling Defendants shall establish an interest-bearing escrow account in a federally-insured bank duly chartered in the State of New Jersey and remit to that escrow account funds equivalent to the amount of the contested Future Response Costs. The Settling Defendants shall send to the United States, as provided in Section XXVI (Notices and Submissions), a copy of the transmittal letter and check paying the uncontested Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. Simultaneously with establishment of the escrow account,

the Settling Defendants shall initiate the Dispute Resolution procedures in Section XIX (Dispute Resolution). If the United States prevails in the dispute, within 5 days of the resolution of the dispute, the Settling Defendants shall pay the sums due (with accrued interest) to the United States in the manner described in Paragraph 52. If the Settling Defendants prevail concerning any aspect of the contested costs, the Settling Defendants shall pay that portion of the costs (plus associated accrued interest) for which they did not prevail to the United States in the manner described in Paragraph 52; Settling Defendants shall be disbursed any balance of the escrow account. The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XIX (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding the Settling Defendants' obligation to reimburse the United States for its Future Response Costs.

54. In the event that the payments required by Paragraph 51 are not made within 30 days of the effective date of this Consent Decree or the payments required by Paragraph 52 are not made within 30 days of the Settling Defendants' receipt of the bill, Settling Defendants shall pay Interest on the unpaid balance. The Interest to be paid on Past Response Costs under this Paragraph shall begin to accrue 30 days after the effective date of this Consent Decree. The Interest on Future Response Costs shall begin to accrue on the

date of the bill. The Interest shall accrue through the date of the Settling Defendant's payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to Plaintiffs by virtue of Settling Defendants' failure to make timely payments under this Section. The Settling Defendants shall make all payments required by this Paragraph in the manner described in Paragraph 51.

XVII. INDEMNIFICATION AND INSURANCE

55. a. The United States does not assume any liability by entering into this agreement or by virtue of any designation of Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Settling Defendants shall indemnify, save and hold harmless the United States and its officials, agents, employees, contractors, subcontractors, or representatives for or from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree, including, but not limited to, any claims arising from any designation of Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Further, the Settling Defendants agree to pay the United States all costs it incurs including, but not limited to, attorneys fees and other

expenses of litigation and settlement arising from, or on account of, claims made against the United States based on negligent or other wrongful acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree. The United States shall not be held out as a party to any contract entered into by or on behalf of Settling Defendants in carrying out activities pursuant to this Consent Decree. Neither the Settling Defendants nor any such contractor shall be considered an agent of the United States.

b. The United States shall give Settling Defendants notice of any claim for which the United States plans to seek indemnification pursuant to Paragraph 55.a., and shall consult with Settling Defendants prior to settling such claim.

56. Settling Defendants waive all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Settling Defendants shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on

account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

57. No later than 15 days before commencing any on-site Work, Settling Defendants shall secure, and shall maintain until the first anniversary of EPA's Certification of Completion of the Remedial Action and Removal Action pursuant to Paragraph 47.b. of Section XIV ("Certification of Completion of Remedial Action and Removal Action") comprehensive general liability insurance with limits of \$20 million dollars, combined single limit, and automobile liability insurance with limits of \$10 million dollars, combined single limit, naming the United States as an additional insured. In addition, for the duration of this Consent Decree, Settling Defendants shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Settling Defendants in furtherance of this Consent Decree. Prior to commencement of the Work under this Consent Decree, Settling Defendants shall provide to EPA certificates of such insurance and a copy of each insurance policy. Settling Defendants shall resubmit such certificates and copies of policies each year on the anniversary of the effective date of this Consent Decree. If

Settling Defendants demonstrate by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then, with respect to that contractor or subcontractor, Settling Defendants need provide only that portion of the insurance described above which is not maintained by the contractor or subcontractor.

XVIII. FORCE MAJEURE

58. "Force majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of the Settling Defendants, of any entity controlled by Settling Defendants, or of Settling Defendants' contractors, that delays or prevents the performance of any obligation under this Consent Decree despite Settling Defendants' best efforts to fulfill the obligation. The requirement that the Settling Defendants exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any potential force majeure event (1) as it is occurring and (2) following the potential force majeure event, such that the delay is minimized to the greatest extent possible. "Force Majeure" does not include financial inability to complete the Work or a failure to attain the Performance Standards.

59. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, the Settling Defendants shall notify orally EPA's Project Coordinator or, in his or her absence, EPA's Alternate Project Coordinator or, in the event both of EPA's designated representatives are unavailable, the Chief of the New Jersey Remediation Branch, Emergency & Remedial Response Division, Region II, within 48 hours of when Settling Defendants first knew that the event might cause a delay. Within 5 days thereafter, Settling Defendants shall provide in writing to EPA an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; the Settling Defendants' rationale for attributing such delay to a force majeure event if they intend to assert such a claim; and a statement as to whether, in the opinion of the Settling Defendants, such event may cause or contribute to an endangerment to public health, welfare or the environment. The Settling Defendants shall include with any notice all available documentation supporting their claim that the delay was attributable to a force majeure. Failure to comply with the above requirements shall preclude Settling Defendants from asserting any claim of force majeure for that event for the period of time of

such failure to comply, and for any additional delay caused by such failure. Settling Defendants shall be deemed to know of any circumstance of which Settling Defendants, any entity controlled by Settling Defendants, or Settling Defendants' contractors knew or should have known.

60. If EPA agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, EPA will notify the Settling Defendants in writing of its decision. If EPA agrees that the delay is attributable to a force majeure event, EPA will notify the Settling Defendants in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

61. If the Settling Defendants elect to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution), they shall do so no later than 15 days after receipt of EPA's notice. In any such proceeding, Settling Defendants shall have the burden of demonstrating by a preponderance of the evidence

that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Settling Defendants complied with the requirements of Paragraphs 58 and 59, above. If Settling Defendants carry this burden, the delay at issue shall be deemed not to be a violation by Settling Defendants of the affected obligation of this Consent Decree identified to EPA and the Court.

XIX. DISPUTE RESOLUTION

62. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by the United States to enforce obligations of the Settling Defendants that have not been disputed in accordance with this Section, and the procedures set forth in this section shall not apply to decisions by EPA regarding Performance Standards (or Alternate Performance standards considered by EPA).

63. Any dispute which arises under or with respect to this Consent Decree shall in the first instance be the subject of informal negotiations between the parties to the dispute. The period for informal negotiations shall not exceed 20 days from the

time the dispute arises, unless it is modified by written agreement of the parties to the dispute. The dispute shall be considered to have arisen when one party sends the other parties a written Notice of Dispute.

64. a. In the event that the parties cannot resolve a dispute by informal negotiations under the preceding Paragraph, then the position advanced by EPA shall be considered binding unless, within 30 days after the conclusion of the informal negotiation period, Settling Defendants invoke the formal dispute resolution procedures of this Section by serving on the United States a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by the Settling Defendants. The Statement of Position shall specify the Settling Defendants' position as to whether formal dispute resolution should proceed under Paragraph 65 or Paragraph 66.

b. Within 60 days after receipt of Settling Defendants' Statement of Position, EPA will serve on Settling Defendants its Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by EPA. EPA's Statement of Position shall include a statement as to whether formal dispute resolution should proceed under Paragraph 65 or 66. Within 30 days

after receipt of EPA's Statement of Position, Settling Defendants may submit a Reply.

c. If there is disagreement between EPA and the Settling Defendants as to whether dispute resolution should proceed under Paragraph 65 or 66 the parties to the dispute shall follow the procedures set forth in the paragraph determined by EPA to be applicable. However, if the Settling Defendants ultimately appeal to the Court to resolve the dispute, the Court shall determine which paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs 65 and 66.

65. Formal dispute resolution for disputes pertaining to the selection or adequacy of any response action and all other disputes that are accorded review on the administrative record under applicable principles of administrative law shall be conducted pursuant to the procedures set forth in this Paragraph. For purposes of this Paragraph, the adequacy of any response action includes, without limitation: (1) the adequacy or appropriateness of plans, procedures to implement plans, or any other items requiring approval by EPA under this Consent Decree; and (2) the adequacy of the performance of response actions taken pursuant to this Consent Decree. Nothing in this Consent Decree shall be construed to allow any dispute by Settling Defendants regarding the validity of the provisions of the OU#1 ROD or the provisions of the Action Memorandum.

a. An administrative record of the dispute shall be maintained by EPA and shall contain all statements of position, including supporting documentation, submitted pursuant to this Section. Where appropriate, EPA may allow submission of supplemental statements of position by the parties to the dispute.

b. The Director of the Emergency & Remedial Response Division, EPA Region II, will issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph 65.a. This decision shall be binding upon the Settling Defendants, subject only to the right to seek judicial review pursuant to 64.c. and d.

c. Any administrative decision made by EPA pursuant to Paragraph 65.b. shall be reviewable by this Court, provided that a motion for judicial review of the decision is filed by the Settling Defendants with the Court and served on all Parties within 10 days of receipt of EPA's decision. The motion shall include a description of the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. The United States may file a response to Settling Defendants' motion.

d. In proceedings on any dispute governed by this Paragraph, Settling Defendants shall have the burden of demonstrating that the decision of the Emergency & Remedial

Response Division Director is arbitrary and capricious or otherwise not in accordance with law. Judicial review of EPA's decision shall be on the administrative record compiled pursuant to Paragraph 65.a.

66. Formal dispute resolution for disputes that neither pertain to the selection or adequacy of any response action nor are otherwise accorded review on the administrative record under applicable principles of administrative law, shall be governed by this Paragraph.

a. Following receipt of Settling Defendants' Statement of Position submitted pursuant to Paragraph 64, the Director of the Emergency & Remedial Response Division, EPA Region II, will issue a final decision resolving the dispute. The Emergency & Remedial Response Division Director's decision shall be binding on the Settling Defendants unless, within 10 days of receipt of the decision, the Settling Defendants file with the Court and serve on the parties a motion for judicial review of the decision setting forth the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the Consent Decree. The United States may file a response to Settling Defendants' motion.

b. Notwithstanding Paragraph N of Section I (Background) of this Consent Decree, judicial review of any dispute governed by this Paragraph shall be governed by applicable principles of law.

67. The invocation of formal dispute resolution procedures under this Section shall not extend, postpone or affect in any way any obligation of the Settling Defendants under this Consent Decree, not directly in dispute, unless EPA or the Court agrees otherwise. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in Paragraph 76. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Consent Decree. In the event that the Settling Defendants do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XX (Stipulated Penalties).

XX. STIPULATED PENALTIES

68. Settling Defendants shall be liable for stipulated penalties in the amounts set forth in Paragraphs 69 and 70 to the United States for failure to comply with the requirements of this Consent Decree specified below, unless excused under Section XVIII (Force Majeure). "Compliance" by Settling Defendants shall include completion of the activities under this Consent Decree or any work plan or other plan approved under this Consent Decree identified

below in accordance with all applicable requirements of law, this Consent Decree, the SOW, and any plans or other documents approved by EPA pursuant to this Consent Decree and within the specified time schedules established by and approved under this Consent Decree.

69. a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Subparagraph b:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$1,000	1st thru 5th day
\$2,000	6th thru 15th day
\$3,000	16th thru 30th day
\$7,000	31st thru 45th day
\$12,000	46 th day and beyond

b. Compliance milestones subject to the stipulated penalties identified in subparagraph a., above, are as follows:

1. Submittal of the name of the Project Coordinator to EPA pursuant to Section XII of this Consent Decree;
2. Payment of Past Response Costs and Future Response Costs pursuant to Section XVI of this Consent Decree;
3. Payment of Stipulated Penalties pursuant to Section XX of this Consent Decree;

4. Provision of Financial Assurance pursuant to Section XIII of this Consent Decree;
5. Compliance with all reporting requirements set forth in paragraphs 30 and 31 of this Consent Decree;
6. Implementation of Remedial Construction, Operation and Maintenance of the Remedy in accordance with the SOW and this Consent Decree;
7. Implementation of any Additional Work in accordance with any work plan submitted by Settling Defendants and approved by EPA pursuant to Section VI of this Consent Decree;
8. Submission and, if necessary, revision and resubmission of the Remedial Action Work Plan;
9. Submission and, if necessary, revision and resubmission of the Operation and Maintenance and Post Remediation Monitoring Plan;
10. Submission and, if necessary, revision and resubmission of the Notice of Completion and Final Report for the Remedial Construction;
11. Submission and, if necessary, revision and resubmission of the Notice of Completion and Final Report for the Remedial Action and Removal Action;

12. Submission and, if necessary, revision and resubmission of the Notice of Completion and Final Report for Post-Remediation Groundwater Monitoring, or;

13. Submission and, if necessary, revision and resubmission of the Notice of Completion and Final Report for Operation and Maintenance.

70. Settling Defendants shall pay to the Plaintiff stipulated penalties in the amount of \$2,000 per day for each day the Settling Defendants fail to meet any deadline, time limit, or scheduling milestone established in this Consent Decree and not specifically referred to in Paragraph 69 of this Consent Decree.

71. In the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 84 of Section XXI (Covenants Not to Sue by Plaintiff), Settling Defendants shall be liable for a stipulated penalty in the amount of \$50,000.

72. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: (1) with respect to a deficient submission under Section XI (EPA Approval of Plans and Other Submissions), during the period, if any, beginning on the 31st day after EPA's receipt of such submission until the date that

EPA notifies Settling Defendants of any deficiency; (2) with respect to a decision by the Director of the Emergency & Remedial Response Division, EPA Region II, under Paragraph 65.b or 66.a. of Section XIX (Dispute Resolution), during the period, if any, beginning on the 21st day after the date that Settling Defendants' reply to EPA's Statement of Position is received until the date that the Director issues a final decision regarding such dispute; or (3) with respect to judicial review by this Court of any dispute under Section XIX (Dispute Resolution), during the period, if any, beginning on the 31st day after the Court's receipt of the final submission regarding the dispute until the date that the Court issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree.

73. Following EPA's determination that Settling Defendants have failed to comply with a requirement of this Consent Decree, EPA may give Settling Defendants written notification of the same and describe the noncompliance. EPA may send the Settling Defendants a written demand for the payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified the Settling Defendants of a violation.

74. All penalties accruing under this Section shall be due and payable to the United States within 30 days of the Settling Defendants' receipt from EPA of a demand for payment of the penalties, unless Settling Defendants invoke the Dispute Resolution procedures under Section XIX (Dispute Resolution). All payments to the United States under this Section shall be paid via electronic funds transfer ("EFT"). Payment shall be remitted via EFT to Mellon Bank, Pittsburgh, Pennsylvania, as follows:

To make payment via EFT, Settling Defendants shall provide the following information to their bank:

- a. Amount of payment;
- b. Title of Mellon Bank account to receive the payment:
EPA;
- c. Account code for Mellon Bank account receiving the payment: 9108544;
- d. Mellon Bank ABA Routing Number: 043000261;
- e. Name of Respondent;
- f. Case number;
- g. Site/Spill Identifier Number: 02-61

Along with this information, Settling Defendants shall instruct their bank to remit payment in the agreed upon amount via EFT to EPA's account with Mellon Bank. To ensure that your payment is properly recorded, you should send a letter, within one week of the EFT, which references the date of the EFT, the payment amount, the

name of the Site, the case number (02-61) and your name and address to the United States as specified in Section XXVI (Notices and Submissions) and to the following:

Richard Caspe, Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II
290 Broadway, 19th Floor
New York, New York, 10007-1866

as well as to:

Ronald Gherardi, Chief
Financial Management Branch
Office of Policy and Management
U.S. EPA Region II
290 Broadway, 29th Floor
New York, New York, 10007-1866.

75. The payment of penalties shall not alter in any way Settling Defendants' obligation to complete the performance of the Work required under this Consent Decree.

76. Penalties shall continue to accrue as provided in Paragraph 72 during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA that is not appealed to this Court, accrued penalties determined to be owing shall be paid to EPA within 15 days of the agreement or the receipt of EPA's decision or order;

b. If the dispute is appealed to this Court and the United States prevails in whole or in part, Settling Defendants shall pay all accrued penalties determined by the Court to be owed to EPA

within 60 days of receipt of the Court's decision or order, except as provided in Subparagraph c below;

c. If the District Court's decision is appealed by any Party, Settling Defendants shall pay all accrued penalties determined by the District Court to be owing to the United States into an interest-bearing escrow account within 60 days of receipt of the Court's decision or order. Penalties shall be paid into this account as they continue to accrue, at least every 60 days. Within 15 days of receipt of the final appellate court decision, the escrow agent shall pay the balance of the account to EPA or to Settling Defendants to the extent that they prevail.

77. a. If Settling Defendants fail to pay stipulated penalties when due, the United States may institute proceedings to collect the penalties, as well as interest. Settling Defendants shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 74.

b. Nothing in this Consent Decree shall be construed as prohibiting, altering, or in any way limiting the ability of the United States to seek any other remedies or sanctions available by virtue of Settling Defendants' violation of this Decree or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(1) of CERCLA. Provided, however, that the United States shall not seek civil penalties pursuant to Section 122(1) of CERCLA for any violation

for which a stipulated penalty is provided herein, except in the case of a willful violation of the Consent Decree.

78. Notwithstanding any other provision of this Section, the United States may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Consent Decree.

XXI. COVENANTS NOT TO SUE BY PLAINTIFFS

79. In consideration of the actions that will be performed and the payments that will be made by the Settling Defendants under the terms of the Consent Decree, and except as specifically provided in Paragraphs 80, 81 and 83 of this Section, the United States covenants not to sue or to take administrative action against Settling Defendants pursuant to Sections 106 and 107(a) of CERCLA and Section 7003 of RCRA relating to the Site, except the RCRA-regulated landfill on the Site, to which this covenant does not apply. Except with respect to future liability, these covenants not to sue shall take effect upon the receipt by EPA of the payments required by Section XVI (Reimbursement of Response Costs). With respect to future liability, these covenants not to sue shall take effect upon Certification of Completion of the Remedial Action and Removal Action by EPA pursuant to Paragraph 47.b. of Section XIV ("Certification of Completion of the Remedial Action and Removal Action"). These covenants not to sue are conditioned upon the satisfactory performance by Settling Defendants of their

obligations under this Consent Decree. These covenants not to sue extend only to the Settling Defendants and do not extend to any other person.

80. United States' Pre-certification reservations.

Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants (1) to perform further response actions relating to the Site or (2) to reimburse the United States for additional costs of response if, prior to Certification of Completion of the Remedial Action and Removal Action:

(i) conditions at the Site, previously unknown to EPA, are discovered, or

(ii) information, previously unknown to EPA, is received, in whole or in part,

and these previously unknown conditions or information together with any other relevant information indicates that the Remedial Action is not protective of human health or the environment.

81. United States' Post-certification reservations.

Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to

compel Settling Defendants (1) to perform further response actions relating to the Site or (2) to reimburse the United States for additional costs of response if, subsequent to Certification of Completion of the Remedial Action and Removal Action:

(i) conditions at the Site, previously unknown to EPA, are discovered, or

(ii) information, previously unknown to EPA, is received, in whole or in part,

and these previously unknown conditions or this information together with other relevant information indicate that the Remedial Action or Removal Action is not protective of human health or the environment.

82. For purposes of Paragraph 80, the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date the OU#1 ROD was signed and set forth in the Record of Decision for the Site and the administrative record supporting the Record of Decision. For purposes of Paragraph 81, the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date of Certification of Completion of the Remedial Action and Removal Action and set forth in the Record of Decision, the administrative record supporting the Record of Decision, the post-OU#1 ROD administrative record, or in any information received by EPA pursuant to the requirements of this

Consent Decree prior to Certification of Completion of the Remedial Action and Removal Action.

83. General reservations of rights. The covenants not to sue set forth above do not pertain to any matters other than those expressly specified in Paragraph 79. The United States reserves, and this Consent Decree is without prejudice to, all rights against Settling Defendants with respect to all other matters, including but not limited to, the following:

(1) claims based on a failure by Settling Defendants to meet a requirement of this Consent Decree;

(2) liability arising from the past, present, or future disposal, release, or threat of release of Waste Materials outside of the Site;

(3) liability for future disposal of Waste Material at the Site, other than as provided in the OU#1 ROD, the Action Memorandum, the Work, or otherwise ordered by EPA;

(4) liability for damages for injury to, destruction or loss of natural resources, and for the costs of any natural resource damage assessments;

(5) criminal liability;

(6) liability for violations of federal or state law which occur during or after implementation of the Remedial Action; and

(7) liability, prior to Certification of Completion of the Remedial Action and/or Removal Action, for additional

response actions that EPA determines are necessary to achieve Performance Standards, but that cannot be required pursuant to Paragraph 11 (Modification of the SOW or Related Work Plans);

(8) previously incurred costs of response above the amounts reimbursed pursuant to Paragraph 51;

(9) liability for costs that the United States will incur related to the Site but are not within the definition of Future Response Costs.

84. Work Takeover In the event EPA determines that Settling Defendants have ceased implementation of any portion of the Work, are seriously or repeatedly deficient or late in their performance of the Work, or are implementing the Work in a manner which may cause an endangerment to human health or the environment, EPA may assume the performance of all or any portions of the Work as EPA determines necessary. Settling Defendants may invoke the procedures set forth in Section XIX (Dispute Resolution), Paragraph 65, to dispute EPA's determination that takeover of the Work is warranted under this Paragraph. Costs incurred by the United States in performing the Work pursuant to this Paragraph shall be considered Future Response Costs that Settling Defendants shall pay pursuant to Section XVI (Reimbursement of Response Costs).

85. Notwithstanding any other provision of this Consent Decree, the United States retains all authority and reserves all rights to take any and all response actions authorized by law.

XXII. COVENANTS BY SETTLING DEFENDANTS

86. Covenant Not to Sue. Subject to the reservations in Paragraph 87, Settling Defendants hereby covenant not to sue and agree not to assert any claims or causes of action against the United States with respect to the Work, and Past and Future Response Costs as defined herein or this Consent Decree, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b)(2), 107, 111, 112, 113 or any other provision of law;

b. any claims against the United States, including any department, agency or instrumentality of the United States under CERCLA Sections 107 or 113 related to the Site, or

c. any claims arising out of response activities at the Site, including claims based on EPA's selection of response actions, oversight of response activities or approval of plans for such activities.

D. any direct or indirect claim for reimbursement from the NL Industries, Inc., Special Account.

87. The Settling Defendants reserve, and this Consent Decree is without prejudice to, claims against the United States, subject to the provisions of Chapter 171 of Title 28 of the United States Code, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States while acting within the scope of his office or employment under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, any such claim shall not include a claim for any damages caused, in whole or in part, by the act or omission of any person, including any contractor, who is not a federal employee as that term is defined in 28 U.S.C. § 2671; nor shall any such claim include a claim based on EPA's selection of response actions, or the oversight or approval of the Settling Defendants' plans or activities. The foregoing applies only to claims which are brought pursuant to any statute other than CERCLA and for which the waiver of sovereign immunity is found in a statute other than CERCLA;

88. Nothing in this Consent Decree shall be deemed to constitute preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

89. Settling Defendants agree to waive all claims or causes of action that they may have for all matters relating to the Site, including for contribution, against the following persons: a.

any person (i) whose liability to Settling Defendants with respect to the Site is based solely on CERCLA § 107(a)(3) or (4), (ii) who arranged for the disposal, treatment, or transport for disposal or treatment, or accepted for transport for disposal or treatment, of only Municipal Solid Waste or Sewage Sludge owned by such person, and (iii) who is a Small Business, a Small Non-profit Organization, or the Owner, Operator, or Lessee of Residential Property; and

b. any person (i) whose liability to Settling Defendants with respect to the Site is based solely on CERCLA § 107(a)(3) or (4), and (ii) who arranged for the disposal, treatment, or transport for disposal or treatment, or accepted for transport for disposal or treatment, of .002% (based on pounds) of the total solid materials containing hazardous substances generated and disposed of at the Site, except where EPA has determined that such material contributed or could contribute significantly to the costs of response at the Site.

XXIII. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION

90. Nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Consent Decree. The preceding sentence shall not be construed to waive or nullify any rights that any person not a signatory to this decree may have under applicable law. Each of the Parties expressly reserves any and all rights (including, but not limited to, any right to contribution), defenses, claims,

demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto.

91. The Parties agree, and by entering this Consent Decree this Court finds, that the Settling Defendants are entitled, as of the effective date of this Consent Decree, to protection from contribution actions or claims as provided by CERCLA Section 113(f)(2), 42 U.S.C. § 9613(f)(2) for Matters Addressed in this Consent Decree.

92. The Settling Defendants agree that with respect to any suit or claim for contribution brought by them for matters related to this Consent Decree they will notify the United States in writing no later than 60 days prior to the initiation of such suit or claim.

93. The Settling Defendants also agree that with respect to any suit or claim for contribution brought against them for matters related to this Consent Decree they will notify in writing the United States within 10 days of service of the complaint on them. In addition, Settling Defendants shall notify the United States within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial.

94. In any subsequent administrative or judicial proceeding initiated by the United States for injunctive relief, recovery of

response costs, or other appropriate relief relating to the Site, Settling Defendants shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XXI (Covenants Not to Sue by Plaintiff).

XXIV. ACCESS TO INFORMATION

95. Settling Defendants shall provide to EPA, upon request, copies of all documents and information within their possession or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Consent Decree, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Settling Defendants shall also make available to EPA, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

96. a. Settling Defendants may assert business confidentiality claims covering part or all of the documents or information

submitted to Plaintiff under this Consent Decree to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to EPA, or if EPA has notified Settling Defendants that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA, the public may be given access to such documents or information without further notice to Settling Defendants.

b. The Settling Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege in lieu of providing documents, they shall provide the Plaintiff with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the contents of the document, record, or information; and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or

generated pursuant to the requirements of the Consent Decree shall be withheld on the grounds that they are privileged.

97. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site.

XXV. RETENTION OF RECORDS

98. Until 10 years after the Settling Defendants' receipt of EPA's notification pursuant to Paragraph 47.b. of Section XIV ("Certification of Completion of the Remedial Action and Removal Action"), each Settling Defendant shall preserve and retain all records and documents now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or liability of any person for response actions conducted and to be conducted at the Site, regardless of any corporate retention policy to the contrary. Until 10 years after the Settling Defendants' receipt of EPA's notification pursuant to Paragraph 47.b. of Section XIV ("Certification of Completion of the Remedial Action and Removal Action"), Settling Defendants shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to the performance of the Work.

99. At the conclusion of this document retention period, Settling Defendants shall notify the United States at least 90 days prior to the destruction of any such records or documents, and, upon request by the United States, Settling Defendants shall deliver any such records or documents to EPA. The Settling Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege, they shall provide the Plaintiffs with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the subject of the document, record, or information; and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of the Consent Decree shall be withheld on the grounds that they are privileged.

100. Each Settling Defendant hereby certifies individually that, to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information relating to its potential liability regarding the Site since notification of potential liability by the United States or the

State or the filing of suit against it regarding the Site and that it has fully complied with any and all EPA requests for information pursuant to Section 104(e) and 122(e) of CERCLA, 42 U.S.C. 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. 6927.

XXVI. NOTICES AND SUBMISSIONS

101. Whenever, under the terms of this Consent Decree, written notice is required to be given or a report or other document is required to be sent by one Party to another, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing. All notices and submissions shall be considered effective upon receipt, unless otherwise provided. Written notice as specified herein shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the United States, EPA, and the Settling Defendants, respectively.

As to the United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044
Re: DJ # 90-11-2-1075

and

As to EPA:

New Jersey Superfund Branch
Office of Regional Counsel
United States Environmental Protection Agency
Region II
290 Broadway - 17th Floor
New York, NY 10007-1866
Attn: NL Industries Site Staff Attorney

New Jersey Remediation Branch
Emergency & Remedial Response Division
United States Environmental Protection Agency
Region II
290 Broadway - 19th Floor
New York, NY 10007-1866
Attn: NL Industries Project Coordinator

As to the State:

Paul Harvey, Case Manager
NJDEP
Bureau of Federal Case Management
401 East State Street
P.O. Box 028
Trenton, NJ 08625

As to the Settling Defendants:

AlliedSignal
c/o Pamela J. Cissak
AlliedSignal
PO Box 2245
101 Columbia Road
Morristown, NJ 07962

and

C & D Technologies, Inc.
c/o Seth v.d.H. Cooley
Duane, Morris & Heckscher
One Liberty Place
Philadelphia, PA 19103-7396

and

Exide Corporation
c/o Ari D. Levine
Exide Corporation
645 Penn Station
Reading, PA 1612-4205

and

GNB Technologies, Inc.
c/o Susan M. Franzetti
Gardner, Carton & Douglas
Quaker Tower, Suite 3400
341 N. Clark Street
Chicago, IL 60610-4795

and

Johnson Controls, Inc.
c/o Dennis P. Reis
Quarles & Brady
411 East Wisconsin Ave.
Milwaukee, WI 53202

and

NL Industries, Inc.
c/o Marcus A. Martin
Bartlit, Beck, Herman, Palenchar & Scott
The Kitteridge Building
511 Sixteenth Street - Suite 700
Denver, CO 80202

XXVII. EFFECTIVE DATE

102. The effective date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court, except as otherwise provided herein.

XXVIII. RETENTION OF JURISDICTION

103. This Court retains jurisdiction over both the subject matter of this Consent Decree and the Settling Defendants for the

duration of the performance of the terms and provisions of this Consent Decree for the purpose of enabling any of the Parties to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XIX (Dispute Resolution) hereof.

XXIX. APPENDICES

104. The following appendices are attached to and incorporated into this Consent Decree:

"Appendix A" is the OU#1 ROD.

"Appendix B" is the SOW.

"Appendix C" is the description and/or map of the Site.

"Appendix D" is the complete list of the Settling Defendants.

"Appendix E" is the Action Memorandum

XXX. COMMUNITY RELATIONS

105. Settling Defendants shall propose to EPA their participation in the community relations plan to be developed by EPA. EPA will determine the appropriate role for the Settling Defendants under the Plan. Settling Defendants shall also cooperate with EPA in providing information regarding the Work to the public. As requested by EPA, Settling Defendants shall participate in the preparation of such information for dissemination to the public and in public meetings which may be

held or sponsored by EPA to explain activities at or relating to the Site.

XXXI. MODIFICATION

106. Schedules specified in this Consent Decree for completion of the Work may be modified by agreement of EPA and the Settling Defendants. All such modifications shall be made in writing.

107. Except as provided in Paragraph 11 ("Modification of the SOW or related Work Plans"), no material modifications shall be made to the SOW without written notification to and written approval of the United States, Settling Defendants, and the Court. Prior to providing its approval to any modification, the United States will provide the State with a reasonable opportunity to review and comment on the proposed modification. Modifications to the SOW that do not materially alter that document may be made by written agreement between EPA, after providing the State with a reasonable opportunity to review and comment on the proposed modification, and the Settling Defendants.

108. Non-material modifications to the Consent Decree not addressed in Paragraphs 106 and 107 may be made by written modification to and written approval by the United States. Such non-material modifications will become effective upon filing with the Court. Nothing in this Decree shall be deemed to alter the Court's power to enforce, supervise or approve modifications to this Consent Decree.

XXXII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

109. This Consent Decree shall be lodged with the Court for a period of not less than thirty (30) days for public notice and comment in accordance with Section 122(d)(2) of CERCLA, 42 U.S.C. § 9622(d)(2), and 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its consent if the comments regarding the Consent Decree disclose facts or considerations which indicate that the Consent Decree is inappropriate, improper, or inadequate. Settling Defendants consent to the entry of this Consent Decree without further notice.

110. If for any reason the Court should decline to approve this Consent Decree in the form presented, this agreement is voidable at the sole discretion of any Party and the terms of the agreement may not be used as evidence in any litigation between the Parties.

XXXIII. SIGNATORIES/SERVICE

111. Each undersigned representative of a Settling Defendant to this Consent Decree and the Assistant Attorney General for Environment and Natural Resources of the Department of Justice certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such Party to this document.

112. Each Settling Defendant hereby agrees not to oppose entry of this Consent Decree by this Court or to challenge any provision of this Consent Decree unless the United States has notified the

Settling Defendants in writing that it no longer supports entry of the Consent Decree.

113. Each Settling Defendant shall identify, on the attached signature page, the name, address and telephone number of an agent who is authorized to accept service of process by mail on behalf of that Party with respect to all matters arising under or relating to this Consent Decree. Settling Defendants hereby agree to accept service in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons.

XXXIV. ADDITIONAL PARTIES

114. Additional parties may be added to this Consent Decree pursuant to Paragraph 108 with the consent of the Settling Defendants and the United States within sixty (60) days after EPA transmits a *de minimis* settlement offer to the *de minimis* PRPs. Nothing in this provision shall modify the effective date of this Consent Decree, nor shall it alter the time frame and schedules set forth herein. The decision of the United States with respect to the proposed addition of the parties is within its prosecutorial discretion and is not reviewable or subject to dispute resolution. The United States reserves the right to withdraw or withhold its consent if the addition of a particular party is inappropriate, improper or inadequate.

XXXV. DISBURSEMENT OF SPECIAL ACCOUNT FUNDS TO SETTLING PARTIES

115. Special Account. The Parties acknowledge that EPA anticipates depositing certain proceeds from EPA's settlement with the de minimis parties associated with the Site, including any interest earned thereon, in a Special Account, pursuant to Section 122(b)(3) of CERCLA, 42 U.S.C. §9622(b)(3). Subject to the terms and conditions set forth in this Consent Decree, EPA agrees to make available all funds in the NL Industries, Inc., Special Account for payment to Settling Defendants for performance of the Work under this Consent Decree. EPA shall disburse such funds from the NL Industries, Inc., Special Account to Settling Defendants in accordance with the procedures set forth in this section.

116. Certification by Settling Defendants. Within thirty (30) days of EPA's written (1) Certification of Completion of the Construction of the soils/sediment component of the Work; (2) Certification of Completion of the Construction of the groundwater component of the Work; (3) Certification of Completion of the Remedial Action and Removal Action; or (4) Certification of Completion of the Work pursuant to Paragraphs 46, 47 and 48 of this Consent Decree, Settling Defendants shall submit to EPA a certification of the complete and accurate total costs of the costs incurred and paid by Settling Defendants pursuant to the requirements of this Consent Decree. Settling Defendants' certification for each phase shall contain the following statement

signed by the Chief Financial Officer of a Settling Party: "To the best of my knowledge, after thorough investigation and review of Settling Defendants' detailed cost documentation for performance of the [describe phase] of the Work, I certify that the information contained in or accompanying this submittal is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." Settling Defendants' submittal(s) of the complete and accurate total of response costs for performance of the Work incurred by Settling Defendants pursuant to this settlement agreement, as required to be certified to EPA pursuant to this paragraph, shall not include: (i) costs incurred by Settling Defendants in reimbursing the United States for Future Response Costs under this settlement agreement; (ii) attorney fees or costs; (iii) costs of any response activities Settling Defendants perform that were not required under, or approved by EPA pursuant to, this settlement agreement; (iv) costs related to Settling Defendants' litigation, settlement, or responsible party or defendant search activities; (v) internal costs of the Settling Defendants, including but not limited to, salaries, travel, or in-kind services; or (vi) interest or stipulated or other penalties paid pursuant to Sections XVI or XX of this settlement agreement.

117. Timing and Amount of Payments from Special Account. Within ninety (90) days of EPA's receipt of Settling Defendants' certification, EPA shall pay from the NL Industries, Inc., Special Account to the Settling Defendants the lesser of either: (a) the amount of Settling Defendants' complete and accurate total of response costs for performance of the Work, as certified by Settling Defendants; or (b) the funds remaining in the NL Industries, Inc., Special Account at the time payment is due, as that amount is determined by EPA. Payment shall be made by EPA to: Quarles & Brady Client Trust Account, c/o Dennis Reis, Quarles & Brady, 411 East Wisconsin Ave., Milwaukee, WI, 53202. Settling Defendants waive all rights to dispute EPA's determination of the amount of funds remaining in the NL Industries, Inc., Special Account. If EPA finds that the Settling Defendants' certification includes an accounting error or a cost excluded under Paragraph 116 of this section, EPA shall recalculate the response costs and pay the corrected amount. Settling Defendants may dispute EPA's finding pursuant to the dispute resolution provisions of this Consent Decree.

118. Termination of Payments from Special Account. EPA's obligation to make any payment from the NL Industries, Inc., Special Account under this Consent Decree will terminate without reservation: (i) upon EPA's determination that Settling Defendants submitted a false, inaccurate, incomplete, or misleading

certification, or that Settling Defendants failed to submit the certification required under this Consent Decree; or (ii) upon EPA's assumption of performance of any portion of the Work pursuant to Paragraph 84 of this Consent Decree, where such assumption of work is not challenged by Settling Defendants or, if challenged, is upheld under the dispute resolution provisions of this Consent Decree. In the event that EPA assumes performance of a portion or all of the work, Settling Defendants shall be liable for a stipulated penalty as determined under Section XX. of this Consent Decree.

119. Recapture of Special Account Payments. Upon termination of special account payments under this Consent Decree based upon EPA's determination that Settling Defendants submitted a false, inaccurate, incomplete, or misleading certification, or that Settling Defendants failed to submit the certification required under this Consent Decree, EPA shall submit a bill to Settling Defendants for amounts disbursed to the Settling Defendants from the NL Industries, Inc., Special Account pursuant to Section XVI. of this Consent Decree, with accrued interest on that amount. The recapture of special account payments under this provision shall not constitute a waiver of criminal liability, and shall not be in lieu of any other penalty imposed on Settling Defendants under any other applicable provision of law. Interest shall accrue at the rate established pursuant to Section §107(a) of CERCLA, 42 U.S.C.

§9607(a). Interest shall accrue from the date of disbursement of the funds from the NL Industries, Inc., Special Account through the date of repayment. Settling Defendants may dispute EPA's termination of special account payments pursuant to the dispute resolution provisions of Paragraph 66 of this Consent Decree. Within thirty (30) days of the date of the bill, Settling Defendants shall reimburse the United States for all costs billed via electronic funds transfer ("EFT"). Payment shall be remitted via EFT to Mellon Bank, Pittsburgh, Pennsylvania, as follows:

To make payment via EFT, Settling Defendants shall provide the following information to their bank:

- a. Amount of payment;
- b. Title of Mellon Bank account to receive the payment:
EPA;
- c. Account code for Mellon Bank account receiving the
payment: 9108544;
- d. Mellon Bank ABA Routing Number: 043000261;
- e. Name of Respondent;
- f. Case number;
- g. Site/Spill Identifier Number: 02-61

Along with this information, Settling Defendants shall instruct their bank to remit payment in the agreed upon amount via EFT to EPA's account with Mellon Bank. To ensure that your payment is properly recorded, you should send a letter, within one week of the

EFT, which references the date of the EFT, the payment amount, the name of the Site, the case number (02-61) and your name and address to the United States as specified in Section XXVI (Notices and Submissions) and to the following:

Richard Caspe, Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II
290 Broadway, 19th Floor
New York, New York, 10007-1866

as well as to:

Ronald Gherardi, Chief
Financial Management Branch
Office of Policy and Management
U.S. EPA Region II
290 Broadway, 29th Floor
New York, New York, 10007-1866.

120. Balance of Special Account Funds to Trust Fund. After EPA issues its written (1) Certification of Completion of the Construction of the soils/sediment component of the Work; (2) Certification of Completion of the Construction of the groundwater component of the Work; (3) Certification of Completion of the Remedial Action and Removal Action; or (4) Certification of Completion of the Work pursuant to Paragraphs 46, 47, and 48 of this Consent Decree and after EPA completes all payment(s) to Settling Defendants pursuant to this section, if any funds remain in the NL Industries, Inc., Special Account, EPA may cause all or any portion of such funds to revert to the EPA Hazardous Substance Superfund. Such reversion of funds to the EPA Hazardous Substance

Superfund shall not be subject to challenge by Settling Defendants pursuant to the dispute resolution provisions of this Consent Decree or in any other forum.

XXXVI. FUTURE COST RECOVERY

121. Except as provided in Section XXXV. ("Disbursement of Special Account Funds to Settling Parties") Settling Defendants and the United States agree that proceeds of cost recoveries or claims for contribution related to previous work required or performed by EPA and the Work required by this Consent Decree, net of costs incurred in pursuing those recoveries, whether through settlement or judgment, from those that are not parties to this Consent Decree shall be equally divided between the United States and Settling Defendants until the United States has been made whole for its Past Costs, after which the Settling Defendants shall receive all of the proceeds. In the case of such settlements, recoveries shall be divided through joint settlements among such parties and the United States and Settling Defendants, which shall provide for direct payments by such settling parties to the United States and Settling Defendants of the agreed upon settlement amount in accordance with the division of proceeds provided for in this Paragraph. The Settling Defendants shall notify the United States within ten (10) days of the commencement of any settlement negotiations, the estimated waste contribution of the person with whom settlement negotiations have commenced, and the basis for the estimated waste

contribution. Further, Settling Defendants shall give at least thirty (30) days advance notice of any proposed settlement with any person with respect to the recovery of costs relating to the Site. Each party shall be responsible for collecting its own share of any proceeds.

122. Nothing in this Section shall be construed as an agreement on the part of the United States to settle with any person or for any particular terms. Nothing in this Section shall be construed to prohibit the United States from settling with any person at any time on any terms the United States deems appropriate without the participation of the Settling Defendants in such settlement. The United States shall retain in its unreviewable discretion ability to accept or reject any proposed settlement relating to Site.

123. Nothing in this Section shall require any payment to made by the United States in violation of the Miscellaneous Receipts Act, 31 U.S.C. Section 3302(b) and the Anti-Deficiency Act, 31 U.S.C. Sections 1341, 1342, 1349-1351 and 1511.

SO ORDERED THIS

1st DAY OF April, 1999

1999

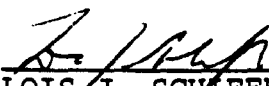

United States District Judge

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. AlliedSignal, Inc. (as successor to Prestolite Batteries, Inc.), et al., relating to the NL Industries Superfund Site.

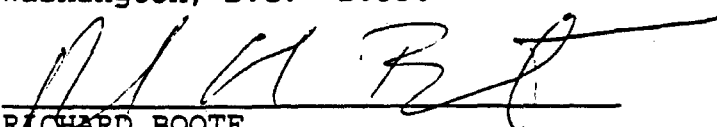
FOR THE UNITED STATES OF AMERICA

Date:

12/23/68



LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources
Division
U.S. Department of Justice
Washington, D.C. 20530



RICHARD BOOTE
Environmental Enforcement Section
Environment and Natural Resources
Division
U.S. Department of Justice
Washington, D.C. 20530

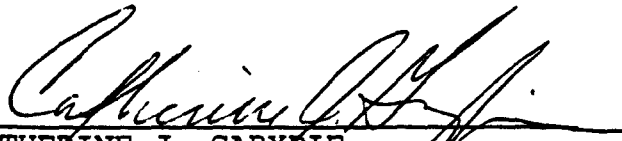
FAITH S. HOTCHBERG
United States Attorney
District of New Jersey
U.S. Department of Justice

By:

SUSAN C. CASSELL
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New York, New York 10007-1866

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. C&D Technologies, Inc., et al., relating to the NL Industries Superfund Site.

FOR AlliedSignal Inc.
Name of Settling Defendant

Date: 4/22/98

Robert J. Ford
Signature

Robert J. Ford
[Name -- Please Type]

Director, Remediation & Evaluation Services
[Title -- Please Type]

P.O. Box 1057, 101 Columbia Road, Morristown, NJ
[Address -- Please Type] 07960

*Low Deat
pic
6/22/98*

Agent Authorized to Accept Service on Behalf of Above-signed Party (Please Type):

Name: Pamela J. Cissik
Title: Senior Counsel - Environmental
Address: P.O. Box 2245, 101 Columbia Road
Morristown, NJ 07960
Tel. Number: (973) 455-5422

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. C&D Technologies, Inc., et al., relating to the NL Industries Superfund Site.

FOR C&D TECHNOLOGIES, INC.

Name of Settling Defendant

Date: June 22, 1998

Signature

Stephen J. Weglarz

[Name -- Please Type]

Vice President Corporate Services & Corporate Counsel

[Title -- Please Type]

1400 Union Meeting Road, Blue Bell, PA 19422

[Address -- Please Type]

Agent Authorized to Accept Service on Behalf of Above-signed Party (Please Type):

Name: Pamela Reich

Title: Director, Environmental, Health & Safety

Address: 1400 Union Meeting Road, Blue Bell, PA 19422

Tel. Number: (215) 619-7886

*Submitted subject to the submittal
of signature pages also to be submitted from:*


- GNB/Gould
- Allied-Signal
- Johnson Controls
- NL Industries

Pamela Reich
C&D Technologies, Inc

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. C&D Technologies, Inc., et al., relating to the NL Industries Superfund Site.

FOR GNB Technologies Inc., as successor-in-interest
Name of Settling Defendant to Gould, Inc.

Date: June 18, 1998


Signature

Thomas J. Smith
[Name -- Please Type]

Vice President and CFO
[Title -- Please Type]

GNB Technologies Inc.
375 Northridge Road, Suite 100, Atlanta, GA 30350
[Address -- Please Type]

Agent Authorized to Accept Service on Behalf of Above-signed Party (Please Type):

Name: Susan M. Franzetti

Title: Counsel for GNB Technologies

Address: 321 N. Clark Street

Chicago, Illinois 60610

Tel. Number: (312) 245-8724

APPENDIX A

- 103 - [114]

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. C&D Technologies, Inc., et al., relating to the NL Industries Superfund Site.

FOR

Exide CorporationName of Settling DefendantDate: June 22, 1998
SignatureAri D. Levine[Name -- Please Type]Assistant General Counsel & Assistant Sec'y.[Title -- Please Type]645 Penn StreetReading, PA 19601[Address -- Please Type]

Agent Authorized to Accept Service on Behalf of Above-signed Party (Please Type):

Name: Ari D. LevineTitle: See aboveAddress: _____
_____Tel. Number: 610/378-0852; 610/371-0463 (Fax)

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. C&D Technologies, Inc., et al., relating to the NL Industries Superfund Site.

FOR

Toharon Controls, Inc.
Name of Settling Defendant

Date:

6/20/98

[Signature]
Signature

James T. Lucke

[Name -- Please Type]

General Counsel, Battery Group, Inc.

[Title -- Please Type]

P.O. Box 591, Milwaukee, WI 53201

[Address -- Please Type]

Agent Authorized to Accept Service on Behalf of Above-signed Party (Please Type):

Name: Dennis P. Reis

Title: _____

Address: 411 E. Wisconsin Avenue, Suite 2523

Milwaukee, WI 53202-4497

Tel. Number: 414-277-5523

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. C&D Technologies, Inc., et al., relating to the NL Industries Superfund Site.

FOR

NL Industries, Inc.

Name of Settling Defendant

Date: June 22, 1998

Signature

Marcus A. Martin

[Name -- Please Type]

Counsel

[Title -- Please Type]

Bartlit Beck Palenchar & Scott

The Kittredge Building

[Address -- Please Type]

511 Sixteenth Street

Denver, Colorado 80202

Agent Authorized to Accept Service on Behalf of Above-signed Party (Please Type):

Name: Marcus A. Martin

Title: Counsel

Address: Bartlit Beck Herman & Scott

The Kittredge Bldg., 511 Sixteenth St.

Tel. Number: (303) 592-3180

APPENDIX A

ROD FOR OPERABLE UNIT ONE

RECORD OF DECISION FACT SHEET
EPA REGION II

Site:

Site name: NL Industries, Inc.

Site location: Pedricktown, Salem County, New Jersey

HRS score: 52.96 (September 8, 1983)

Record of Decision:

Date signed: July 8, 1994

Operating Unit Number: OU-1

Selected remedy: Excavation of soils above 500 ppm lead, solidification/stabilization, and landfilling and capping of treated and non-hazardous soils; extraction and treatment of contaminated ground water with direct discharge to the Delaware River; removal of contaminated stream sediments above 500 ppm of lead and remediation of contaminated sediments in the East Stream and drainage channel north of Route 130.

Capital cost: \$12,076,550

Annual O & M cost: \$432,250

Present-worth cost: \$18,721,350 (5% discount rate/30 years)

Lead: EPA Enforcement

Primary Contact: Joe Gowers (212) 264-5386

Secondary Contact: Kim O'Connell (212) 264-8127

Main PRPs: OU-1: NL Industries, Steve Holt (609) 443-2405
OU-2: Allied Signal, Mark Kamilow (201) 445-2119

Waste:

Waste type: metals (primarily lead), volatile organics

Waste origin: Secondary Lead Smelting

Estimated waste quantity: Approximately 38,000 cubic yards of soil and sediments, in addition to the ground-water plume.

Contaminated medium: soil, ground water, surface water, sediments

T A B L E 1

SOIL REMEDIATION - COMPARISON OF ALTERNATIVES			
EPA CRITERIA	EPA PROPOSED REMEDY (SOIL WASHING)	ALTERNATIVE REMEDY 1 (SOIL STABILIZATION)	ALTERNATE REMEDY 2 (OFF-SITE DISPOSAL/ON-SITE CONTAINMENT OR OFF-SITE REUSE)
1. Overall Protection of Human Health and Environment	Yes (Uses treatment and containment)	Yes (Uses proven treatment and containment techniques)	Yes (Uses treatment, containment, and beneficial use)
2. Compliance with ARARS	Yes	Yes	Yes (Uses treatment, containment, and beneficial use)
3. Long Term Effectiveness and Performance	Yes (Technology removes lead from soil. Residual levels of lead in soil will remain, assuming treatment is effective, subjecting site to future inspection, maintenance and monitoring).	Yes (Technology results in nonleachable nonhazardous material in on-site consolidation area).	Yes (Plan will result in removal of soil above action level from the site and eliminate need to monitor a new on-site disposal area. An estimated volume of 20,000 tons of soil will be beneficially reused).
4. Reduction of Toxicity, Mobility or Volume Through Treatment	Yes (The soil washing process is likely to generate some secondary waste requiring off-site treatment and disposal).	Yes (Technology utilizes proven treatment technology and results in the generation of nonhazardous waste).	Yes (All soils exceeding the remedial action objective will be excavated and removed from the facility for off-site treatment, disposal, or beneficial use).
5. Short-Term Effectiveness	Not Known (Since soil washing is an unproven technology, a starting date for remediation is not known. Additional time would be required for construction of on-site equipment. EPA has estimated 3 years for implementation).	Yes (Since all soil is managed on-site and there is no use of local roads, there is no short-term impact to the community).	Yes (Of all the remedies which have been evaluated, this remedy provides the opportunity for immediate start-up and prompt completion. Because the alternative remedy could be implemented in one work season, the remedy offers immediate benefit for the protection of human health and the environment. Short-term impacts to the community would involve use of local roads for off-site transport of soil).

SOIL REMEDIATION - COMPARISON OF ALTERNATIVES

EPA CRITERIA	EPA PROPOSED REMEDY (SOIL WASHING)	ALTERNATIVE REMEDY 1 (SOIL STABILIZATION)	ALTERNATIVE REMEDY 2 (OFF-SITE DISPOSAL/ON-SITE CONTAINMENT OR OFF-SITE REUSE)
6. Implementability	Not Known (Soil washing is not a proven technology and requires treatability studies to determine implementability).	Yes (Soil stabilization technology has already been demonstrated at the site. Remedy provides for immediate implementation).	Yes (The elements of the remedy are easy to implement and do not require significant developmental activities or feasibility evaluations).
7. Cost	\$10,146,000 (EPA costs can only be considered as estimates, since soil washing is an unproven technology and requires developmental work to evaluate feasibility).	\$5,628,000 (Implementation, for slag treatment, has already been demonstrated to be feasible).	\$8,397,000 (Off-site disposal of hazardous soils; on-site consolidation of nonhazardous soil). \$7,659,000 (Off-site disposal of hazardous soils; off-site beneficial reuse of nonhazardous soils).
8. State Acceptance	Not Known	Not Known	Likely
9. Community Acceptance	Not Likely (During the EPA public meeting, the mayor of Pedricktown expressed serious concerns about the creation of a new on-site disposal area. The community is not likely to accept a proposed plan which allows for creation of a new disposal area).	Not Likely (During the EPA public meeting, the mayor of Pedricktown expressed serious concerns about the creation of a new on-site disposal area. The community is not likely to accept a proposed plan which allows for creation of a new disposal area).	Likely (The alternative remedy is likely to receive community support since all soils above the remedial action objective would be removed from the site for off-site management and for beneficial reuse).

- NOTES:
- 12,500 cubic yards @ \$200/cubic yard
 - 30% of 12,500 cubic yards @ 1.4 tons/cubic yard @ \$200/ton
 - 70% of 12,500 cubic yards @ \$5/ton
 - 70% of 12,500 cubic yards @ 1.4 tons/cubic yard @ \$150/ton
 - These multipliers were utilized uniformly. Engineering and administration costs would be considerably greater for soil washing as this remedy would require 3 years for completion compared to 6-9 months for off-site disposal.
 - 12,500 cubic yards @ 1.4 tons/cubic yard @ \$50/ton
 - 12,500 cubic yards x 1.25 @ 1.4 tons/cubic yard @ \$5/ton
 - See continuation page for potential cost savings associated with off-site beneficial reuse of nonhazardous soils

T A B L E 2

SOIL REMEDIATION - COMPARISON OF COSTS			
	EPA PROPOSED REMEDY (SOIL WASHING/ ON-SITE CONSOLIDATION)	ALTERNATIVE REMEDY 1 (ON-SITE STABILIZATION/ ON-SITE CONSOLIDATION)	ALTERNATE REMEDY 2 (OFF-SITE DISPOSAL/ ON-SITE CONSOLIDATION)
COMMON COSTS:			
Site Work	\$ 660,300	\$ 660,300	\$ 660,300
On-site restoration	\$ 807,500	\$ 807,500	\$ 807,500
Off-site restoration	\$ 109,000	\$ 109,000	\$ 109,000
On-site consolidation pile	\$ 951,500	\$ 951,500	\$ 951,500*
COMMON COSTS (SITE PREP):			
Road relocation	\$ 35,000	\$ 35,000	\$ 35,000
HASP	\$ 20,000	\$ 20,000	\$ 20,000
Wooded area access	\$ 120,000	\$ 120,000	\$ 120,000
Erosion control	\$ 50,000	\$ 50,000	\$ 50,000
VARIABLE COSTS:			
Treatability	\$ 150,000	\$ 25,000	---
Mobilization	\$ 500,000	\$ 150,000	\$ 150,000
Soil Washing	\$ 2,500,000 ^(a)	---	---
Solidification/disposal	\$ 1,050,000 ^(a)	\$ 875,000 ^(a)	---
On-site disposal	\$ 43,750 ^(a)	\$ 78,125 ^(a)	---
Direct placed soils	---	---	\$1,837,500 ^(a)
Treated and placed soils	---	---	\$1,050,000 ^(a)
SUBTOTAL	\$ 6,997,050	\$3,881,425	\$5,790,800
CONTINGENCY (25%)	\$ 1,749,263	\$ 970,356	\$1,447,700
ENGINEERING (15%)^(a)	\$ 1,049,558	\$ 582,714	\$ 868,620
ADMINISTRATION (5%)^(a)	\$ 349,853	\$ 194,071	\$ 289,540
T O T A L	\$10,145,724	\$5,628,066	\$8,396,660*

- NOTES:**
- ^(a) 12,500 cubic yards @ \$200/cubic yard
 - ^(a) 30% of 12,500 cubic yards @ 1.4 tons/cubic yard @ \$200/ton
 - ^(a) 70% of 12,500 cubic yards @ \$5/ton
 - ^(a) 70% of 12,500 cubic yards @ 1.4 tons/cubic yard @ \$150/ton
 - ^(a) These multipliers were utilized uniformly. Engineering and administration costs would be considerably greater for soil washing as this remedy would require 3 years for completion compared to 6-9 months for off-site disposal.
 - ^(a) 12,500 cubic yards @ 1.4 tons/cubic yard @ \$50/ton
 - ^(a) 12,500 cubic yards @ 1.25 @ 1.4 tons/cubic yard @ \$5/ton
 - * See continuation page for potential cost savings associated with off-site beneficial reuse of nonhazardous soils

T A B L E 2 (continued)

SOIL REMEDIATION - COMPLETION OF COSTS		
	ALTERNATIVE REMEDY 2 (OFF-SITE DISPOSAL WITH ON-SITE CONSOLIDATION)	ALTERNATIVE REMEDY 2 (OFF-SITE DISPOSAL WITH OFF-SITE BENEFICIAL REUSE)
Surface preparation	\$ 37,000	---
Disposal	\$147,500	\$147,500
40 ml liner	\$ 79,000	---
Drainage layer	\$ 14,000	---
Root zone soil	\$ 87,000	---
Top soil	\$ 28,000	---
Seed, fertiliser, etc.	\$ 9,000	---
Liner system	\$550,000	---
SUBTOTAL	\$951,500	\$147,500
CONTINGENCY (25%)	\$237,875	\$ 36,875
ENGINEERING (5%)	\$142,725	\$ 22,125
ADMINISTRATION (5%)	\$ 47,575	\$ 7,375
T O T A L	\$1,379,675	\$213,875

NOTE: The information presented above summarizes the two options associated with alternative remedy 2. If nonhazardous soils which pass the TCLP but exceed the EPA remedial action objective are able to be beneficially reused at a local municipal landfill, this option would result in removal of all contaminated soils from the site, would result in additional cost savings, would preclude the construction of a landfill in two acres of wetlands, and could save the county approximately \$500,000 in purchase costs for daily cover.

ATTACHMENT C

**REVIEW AND COMMENTS ON
GROUNDWATER INVESTIGATION AND
REMEDATION STRATEGIES**

**NL INDUSTRIES SUPERFUND SITE
OPERABLE UNIT ONE
PEDRICKTOWN, NEW JERSEY**

15 September 1993
2620701

 **Langan**
Engineering and Environmental Services, Inc.

**REVIEW AND COMMENTS ON GROUNDWATER
INVESTIGATION AND REMEDIATION STRATEGIES**

**NL INDUSTRIES SUPERFUND SITE
OPERABLE UNIT ONE
PEDRICKTOWN, NEW JERSEY**

Prepared by:

**Langan Engineering and Environmental Services, Inc.
350 South Main Street, Suite 103
Doylestown, Pennsylvania 18901**

**15 September 1993
3520701**

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Figure 2	Distribution of Lead in Soil
Figure 3	Schematic of Relationship Between Contaminated Zone and Proposed Recovery System

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Appendix A	Documents Reviewed
Appendix B	Evaluation of the Efficiency of Using Interceptor Well Network as a Groundwater Recovery System

This report summarizes the review of technical and administrative documents which pertain to the groundwater investigation and proposed groundwater remediation at the N.L. Industries Superfund Site, Operation Unit One, Paterson, New Jersey. The objective of the review was to understand site groundwater conditions, as defined in the Remedial Investigation (O'Brien & Gere, 1991), to develop a conceptual technical approach which would best address the remediation of groundwater, to review the Feasibility Study (O'Brien & Gere, 1993) and Proposed Plan (U.S. EPA, 1993), and to evaluate the EPA-selected remediation strategy. This technical assessment included a review of those documents from the Superfund Document Record which were made available to Langan, and which constitute the basis for the selection of the preferred remediation strategy. These documents are listed in Appendix A.

The organization of this report is similar to that in the U.S. EPA Proposed Plan (July 1993). This organization is intended to facilitate preparation of responses to the Proposed Plan, and to provide a logical progression through the technical discussions.

Overall, we conclude that the groundwater remediation preferred by EPA in its Proposed Plan is inappropriate. The data and assumptions that were used to formulate the preferred remediation strategy likely do not represent actual conditions in the shallow aquifer, and the proposed groundwater recovery system is not appropriate to address the potential problem. The proposed plan fails to demonstrate whether the recovery of inorganic compounds from the shallow aquifer matrix is possible, using a groundwater extraction technique, even though such an evaluation could have been conducted using simple rapid field tests (typically less than ten days of field time). We further conclude that the Proposed Plan is invalid because it fails to consider whether the proposed soil remediation would also remedy any problems associated with groundwater quality.

2.0 COMMENTS ON REMEDIAL INVESTIGATION

Our review of the Remedial Investigation (RI) focussed on the interpretations of aquifer conditions and groundwater quality, and on how these interpretations were used in, and affected the decisions in, the Feasibility Study and Proposed Plan, as related to groundwater. Our technical assessment concluded that the Remedial Investigation:

- Demonstrated that the zone of contamination is limited, consists generally of concentrations of target compounds which marginally exceed groundwater quality standards and has not impacted off-site areas.
- Failed to correlate the extent and distribution of contamination in the shallow aquifer with soil remedial investigation findings and failed to consider potential continuing residual sources in soil.
- Demonstrated that the compounds of concern are not mobile, and that the zone of contamination is not expanding over time. Some data indicate it might be decreasing.
- Failed to provide an adequate characterization of either the shallow unconfined aquifer or the actual connection with lower aquifer systems, and failed to explore potential mechanisms to explain the behavior of the target compounds in groundwater.

The RI demonstrated that the zone of contamination in the shallow, unconfined aquifer is limited and restricted to the vicinity of former process/operations areas. Despite this demonstration the RI concluded that these compounds are present in a mobile plume which flows approximately

parallel to the groundwater flow direction. This conclusion does not agree with groundwater monitoring results which did not detect target compounds in downgradient or off-site wells.

The authors of the RI attribute the groundwater contamination to recharge from areas where slag piles were staged. This explanation can not account for either the distribution or extent of compounds in the impacted zone, which are present at low concentrations over a large area, or for higher concentrations at two specific, and limited locations. These locations do not correspond to the locations of the former slag piles. Furthermore, this explanation does not account for the distribution of residual compounds in soil, which is similar to that in groundwater, and which does not indicate contamination from localized sources. Rather, the distribution in unsaturated soil (Figure 8 of the RI) and in groundwater (Figure 33 of the FS) can be correlated very well, demonstrate a non-point source distribution, and indicate a continuing discharge to the shallow aquifer from residual soil contamination over a large and diffuse area. This issue is discussed in greater detail in our comments on the Feasibility Study - Section 3.0 of this report.

The RI demonstrated that the target compounds are not mobile within the shallow aquifer, but still concluded that the contaminated zone represents a "plume." The term "Plume" implies a region of contamination which originates at one or more source areas and migrates, through various mechanisms, within the aquifer. This designation is difficult to reconcile with the groundwater data, and with the interpretations in the RI which conclude that "...[t]he current limited extent of contamination *relative to predicted groundwater flow* (emphasis added) demonstrates that the migration of chemicals within the ground water is being impeded..." (RI - pg. 57). In other words, the compounds within the contaminated zone are not actually moving. The RI also concluded that the contamination in the shallow, unconfined aquifer has not measurably impacted either the first or second confined aquifer, and there has been no impact to potential off-site receptors.

The RI did not include tests or analyses to determine aquifer characteristics, or to explain the behavior of target compounds in the shallow aquifer. Although the RI recognizes the limitations of the existing groundwater database, and recommends additional investigation, which includes installation of additional monitoring wells, replacement of some existing monitoring wells and resampling of all wells, these recommendations have not been implemented. This is of particular importance because the data upon which the ultimate remediation strategy will be decided was generated in 1989 (four years ago). In the intervening time, groundwater conditions and quality might have changed significantly. We note this as a concern because there were significant decreases in the concentrations of sulfates and filterable lead reported for monitoring wells on the northern section of the site during the period 1983 - 1988. Further decreases occurred between the 1988 and 1989 monitoring episodes.

The RI includes no discussion or explanation for these decreases, and does not attempt to explain the presence of the particular suite of compounds which characterize the contaminated zone. The authors of the RI intimate that sulfates are an indicator parameter of the contamination, but an explanation of its presence is not provided. Neither is an attempt to correlate the sulfates with other indicators such as pH, TDS, TSS, turbidity, or target inorganic compounds. We speculate that the presence of sulfates could be related to battery acid (H_2SO_4 - Sulfuric Acid) which has been partially neutralized in the soil environment, where sulfuric acid combines with water, oxygen and humic acid (H_2CO_3) to produce water, carbon dioxide and the soluble sulfate anion (SO_4).

The important issue, however, is that similar decreases in these parameters could have occurred in the ensuing four years, and current groundwater conditions and quality could be very different than presented and predicted in the RI.

Another issue which might be resolved with current groundwater quality data is whether the presence of lead in groundwater around the RCRA landfill might be related to a former

leachate back-up and overflow, and whether the subsequent maintenance of the collection system has resulted in an improvement to groundwater quality in this area.

3.0 COMMENTS ON FEASIBILITY STUDY

Our comments on the Feasibility Study (FS) focus on the relevance of the assumptions used in the evaluation of potential remediation strategies, and consider both technical and regulatory issues which will affect the ultimate strategy selection. We reviewed the FS prior to the U.S. EPA Proposed Plan to avoid preconceived bias from the EPA recommendations and remediation strategy selection.

Our review and assessment of the Feasibility Study concluded that:

- The study did not include an assessment of the recovery potential of the compounds of concern from the shallow aquifer.
- The conceptual remediation design did not include a groundwater extraction-recovery system designed to address the documented zone of contamination.
- The assessments of remediation strategies were conducted without understanding the source(s) of the contamination, and did not consider the potential effects on groundwater quality of the remediation of the overlying, contaminated soil.
- The effects on groundwater quality of source (soil) remediation were not evaluated, even though such an evaluation could have been completed in less than ten days using simple field tests.

- The proposed pumping rates for the recovery-treatment system are unrealistic and do not consider aquifer capacity.

The FS does not evaluate the technical feasibility of the remediation of the shallow, unconfined aquifer, in that it does not assess whether the physical extraction/recovery of the compounds of concern from the aquifer is possible. Tests to evaluate the recoverability of the inorganic compounds are not included in the study. Rather, it is limited to an evaluation of potential treatment and discharge options for (theoretical) groundwater intercepted at the perimeter of the site, which is likely not similar in composition to actual groundwater in the contaminated zone.

Throughout the FS it is assumed that the compounds are distributed homogeneously in the aquifer, and that they are in a dissolved state and completely recoverable. This assumption has no basis in technical fact and is difficult to reconcile with the conclusion in the RI that lead (and possibly other compounds) is not a mobile species as a result of some natural process(es) which arrests possible transport mechanisms. Neither O'Brien and Gere nor the EPA offered an explanation of the mechanism through which pumping groundwater would mobilize non-mobile compounds. In the absence of these evaluations, and the resultant conclusions, none of the potential remediation strategies can be considered feasible.

The proposed use of the existing interceptor wells as a recovery system, rather than for their intended purpose as an interceptor network, is a solution of convenience which fails to address actual conditions. This proposed recovery system would result in an aggregate treatment and discharge capacity of 360,000 gallons per day. Because the extraction points are located around the outer perimeter of the site, we note that approximately 55% of that water (193,000 gpd) would be from off-site or from areas outside the contaminated zone, as defined in the RI. (Our calculations and rationale for this estimate are included in Appendix B.) The FS did not include a design for a groundwater extraction system to recover groundwater specifically from

the contaminated zone, nor did it consider alternative interceptor system designs, which might require lower pumping rates to control groundwater flow.

The FS does not consider the source(s) of the groundwater contamination, or the potential effects of source removal on long-term aquifer quality. The distribution of inorganic compounds in shallow groundwater and the interpretation of migration potential in a plume (FS - Figures 33 through 36) is the key issue upon which the conclusion that aquifer restoration is possible is based. The FS postulates that the immobile inorganic compounds are migrating parallel to groundwater flow in the shallow, unconfined aquifer in a southeast to northwest direction (Figure 33). We question whether this distribution represents a plume, or rather the introduction into the aquifer of a vadose solute from soil contamination throughout the area, such as lead-bearing battery acid. Comparison of Figure 6 of the RI and Figure 33 of the FS (revised and attached as Figures 1 and 2) shows a strong correlation between the distribution of lead in soil and the location of the lead-bearing zone in the upper, unconfined aquifer. In speculation, this latter scenario could account for the decrease in filterable lead between 1983 and 1988 (four years after cessation of facility operations), and also for the absence of migration (acid precipitation neutralized in a pH-normal aquifer).

The FS fails to discuss the possible effects of the removal of the source(s) on groundwater quality, and a proposal to evaluate such effects. Such an evaluation can be accomplished in less than ten days using a simple, rapid field test, which would demonstrate whether there is a continuing discharge from a soil source. This testing would define the leachate production and infiltration rates, would demonstrate the fate of the leachate and explain the behavior of compounds within the shallow aquifer, and would determine whether the proposed recovery of inorganic compounds is possible.

The evaluation would begin by conducting the groundwater investigation tasks proposed in the RI to supplement the existing data base. At the same time, Suction Lysimeters would be

installed in the unsaturated zone at select locations to collect vadose water from suspected source areas. Samples from the saturated and unsaturated zones would then be analyzed for total metals, filterable metals, TDS, TSS, pH, and sulfates. Data from the two media would be compared to determine whether there is potential contaminant communication between soil and groundwater.

Based on these initial data, the monitoring network would be refined, as necessary, and both media would be monitored after a rainfall, to establish the (suspected) causative link between the systems. Monitoring episodes would be conducted before and following precipitation events to estimate the leachate loading rate to the aquifer and to determine the fate of the leachate in the aquifer.

In addition to these observations and analyses, a field extraction (pumping) test, would be conducted to determine the recovery potential of the compounds from the shallow aquifer over time. This would consist of groundwater extraction from a well at the location of highest lead concentration. The well would be pumped at a rate determined during a preliminary well performance test, and would be set to ensure equilibrium flow over a three-day period. Samples would be analyzed from the discharge stream at regular time intervals to determine whether dissolved compounds continue to be released into the aquifer under pumped conditions over time. The test would also be used as an opportunity to collect hydraulic data about the aquifer. If necessary, these data would then be used for the design of a proper groundwater recovery system after soil sources are removed. An additional similar demonstration of the recovery potential of the existing interceptor system could also be performed at this time.

The treatment system discharge options considered in the FS are evaluated using an assumed flow rate which is unrealistic, and which has no technical basis. For each option, a total (aggregate) flow/discharge rate of 250 gallons per minute (gpm) is assumed. This volume was

selected arbitrarily by assuming that the groundwater recovery system would consist of the 49 existing site-perimeter interceptor well points, which would be pumped at 5 gpm each. Apart from assuming that each of the wells could sustain this discharge rate under long term pumping, there is no justification for using all of the interceptor points, some of which are greater than 600 feet from the edge of the 'plume,' and are not down gradient. The locations of the well points in relation to the estimated edge of the contaminated zone are depicted on Figure 3. More importantly, as specified in Section 1.2.3.2. of the FS (page 17), the well point system "... was designed to prevent off-site migration of contaminated groundwater." Later in the FS (Section 3.3.2, page 57) this same system is proposed to "...recover groundwater and limit off-site migration..." which, as documented in the RI and in the Proposed Plan, is not now occurring.

By considering only the recovery/treatment system described above, the remediation strategies which would involve the re-introduction of treated groundwater back into the shallow aquifer were eliminated from the list of viable alternatives. We contend that all of those groundwater discharge options are not only feasible, but preferable if a lower flow/discharge rate is applied. This modified remediation strategy would include an extraction or interceptor system designed and located to recover contaminated groundwater from a well defined zone within the aquifer. We reiterate, however, that even this modified system should not be considered unless the recovery potential of the target compounds is documented, and should be proposed only as a contingency if the removal of the (suspected) source(s) of the continuing discharges (soil) does not result in an improvement in groundwater quality.

4.0

COMMENTS ON U.S.EPA PROPOSED PLAN

Our comments in the previous sections of this report respond to those sections of the Proposed Plan which summarize the documents prepared for the selection by U.S.EPA of

remedial strategies. This section presents our observations and comments on the EPA selection criteria, and the technical basis for selection of the preferred option. Our review of the Proposed Plan was completed only after we had reviewed the RI and FS reports and had formed our own interpretations and conclusions, independently of the EPA selection.

The Proposed Plan relies on data and interpretations from the RI and FS which are either flawed or incomplete, and which do not present an adequate assessment of site conditions upon which to base long-term remediation decisions. The bases for this conclusion include:

- The remedial strategy selection is based on the premise that there is a "...substantial and imminent threat to public health..." which is contrary to the findings documented in the RI and re-stated in the Proposed Plan.
- The Proposed Plan does not consider the potential positive effects on aquifer quality of the remediation of overlying, contaminated soil.
- The Proposed Plan proposes to restore site groundwater quality by using an interceptor system that was designed only to prevent off-site migration.
- The conceptual groundwater remediation strategy includes restoration of a non-use aquifer to groundwater quality standards (for primary drinking water sources) as a means to protect a public which, as agreed to by EPA in the Proposed Plan, is not now being exposed.
- The Proposed Plan does not consider the recommendations in the RI for additional investigation, or those in the FS, that remediation options which include re-introduction of the treated groundwater to the aquifer should be evaluated further. The final selection is made despite this lack of information.

The requirement to remediate groundwater is based on the conclusion that there is a risk to public health and the environment. In particular, EPA has assessed this potential risk assuming that future uses of the site could include residential development, despite its industrial zoning, and despite the deed notching mechanism used frequently by NUDEPE to minimize or eliminate exposure by restricting future land use options. We note in particular the Summary of Risks paragraph on page 9 of the Proposed Plan, which states that "...groundwater...pose(s) an imminent and substantial threat to public health...." presumably through ingestion of groundwater. We question this conclusion considering there has been no off-site impact to groundwater, and no measurable impact to other aquifers by the contamination at the site.

An evaluation of the potential effects of soil remediation should be considered. Therefore, we recommend that future discussions and/or references to potential long-term active aquifer restoration efforts should be in terms of a contingency plan. Considering the existing aquifer conditions, and the demonstrated minimal exposure potential, and considering that groundwater contamination is likely the result of ongoing releases into the shallow aquifer from residual soil contamination throughout the impacted area, there is no justification to require aquifer restoration using a groundwater extraction strategy, without first evaluating the effects of soil (source) remediation on groundwater quality. An appropriate groundwater remediation strategy would be designed and implemented only if source remediation does not result in a decrease in dissolved compound concentrations in the impacted saturated zone, and that compounds in the aquifer become demonstrably mobile, and threaten an exposure to a potential receptor.

The plan proposes to restore site groundwater quality by using an interceptor system that was designed only to prevent off-site migration. This proposed misapplication of the interceptor system would result in pumping groundwater from outside the zone of contamination on-site. Consequently, the feasibility study on which the Proposed Plan is based is significantly, if not fatally, flawed in its evaluation of groundwater recovery and treatment system options.

Much of the decision of remediation technology feasibility and selection should be predicated on the definition of the extent of the contamination which must be remediated to comply with groundwater quality standards. In other words, the decision of whether to address all locations where lead concentrations in groundwater exceed 10 ppb (New Jersey Groundwater Quality Criterion), or whether some other concentration is appropriate, must be made before the technical feasibility of any option can be assessed. In the Proposed Plan, the remediation objective is a complete restoration of aquifer quality, using the practical quantitation limit for lead (5 ppb) as the numeric objective. The NJDEPE has a mechanism which will allow interim exceedence of this standard, however, by establishing a Classification Exception Area (N.J.A.C. 7.9-6.6). This would allow discharge of treated water back to the aquifer at higher concentrations than the standard. The Classification Exception Area is granted only through the duration of the remediation period, after which the existing standard will again be applicable. The ultimate goal would be the restoration of the aquifer to the applicable standard(s), if technologically feasible.

By obtaining a Classification Area Exception a groundwater recovery system could be designed to address only those portions of the aquifer with significant contamination, and the re-introduction of the treated water could be a viable option, based on the lower flow/discharge rates, and/or by establishing an exemption zone. In this way, a treatment system which is capable of reducing concentrations to the MCL(s) could be installed, but operated under a New Jersey Aquifer Classification Exemption to treat and discharge back to groundwater, at significantly higher concentrations. The aquifer would be monitored over time to demonstrate remediation performance, and to evaluate and/or reconsider the ultimate remediation objectives.

The Proposed Plan presents the U.S.EPA selection of a remediation strategy despite the lack of the additional data and analyses recommended in the RI and FS. The RI recommended additional groundwater investigation to better characterize aquifer conditions and the nature

and extent of the contaminated zone. The FS recommended further evaluation of the remediation alternatives which include the re-introduction of treated groundwater back into the aquifer, because they are viable options. Neither of these sets of recommendations were implemented, but the Proposed Plan culminates in a recommendation for a single preferred strategy.

5.0 CONCLUSIONS AND RECOMMENDATIONS

We conclude that the groundwater portion U.S.EPA Proposed Plan is flawed in that the data used to formulate the remediation strategy likely do not represent actual conditions in the aquifer.

We conclude that the Proposed Plan is invalid because the selection of the treatment and discharge methods was predicated on unrealistic assumptions regarding the capacity of both the groundwater recovery and treatment systems.

We conclude that the FS is incomplete in that it does not evaluate, or even address, the recovery potential of site specific target compounds, and has not proposed a groundwater extraction/recovery system designed to address the zone of contamination, as defined in the RI.

We agree with the conclusions in the RI that the target compounds present in the shallow aquifer are not mobile, but we disagree that their presence represents a "plume" of contamination which is migrating parallel to the general groundwater flow direction. We conclude that the presence of these compounds is more likely the result of non-point source discharges from residual soil contamination. We also agree with the recommendations in the

At that additional investigation of groundwater conditions and quality are required, and note that the Proposed Plan was prepared without the benefit of such additional data.

We conclude that removal of source area(s) in the overlying unsaturated soil would likely result in an improvement in groundwater quality over time, without active remediation of the aquifer.

We recommend a field testing program to demonstrate whether there is a continuing soil source of groundwater contamination.

We recommend a re-evaluation of the quality of groundwater in the shallow aquifer to confirm the results of the previous monitoring episodes, and to refine the estimate of the extent of the contaminated zone and the distribution of contaminants within the aquifer.

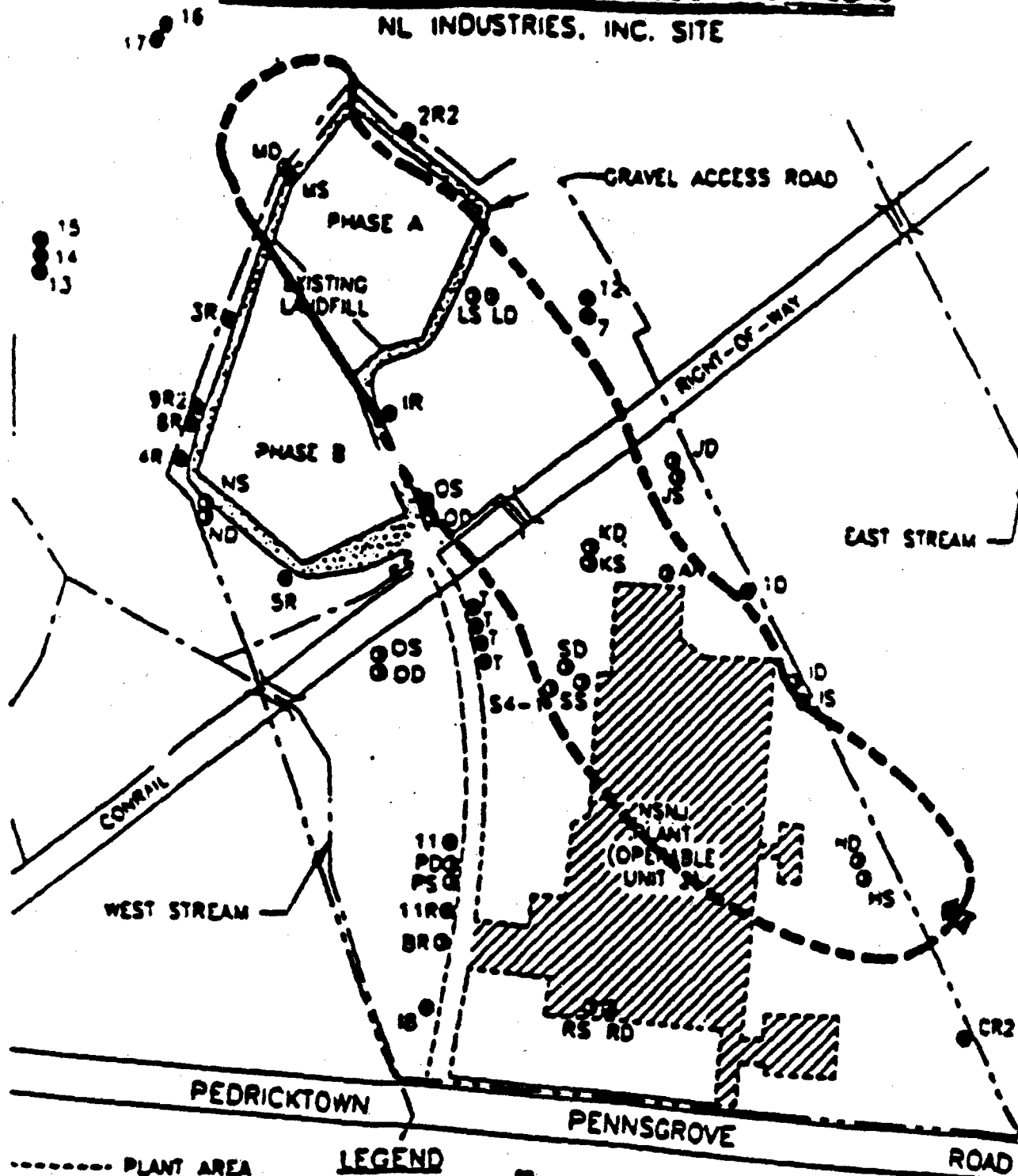
We recommend determination of the recovery potential of inorganic compounds from the aquifer by using an extraction test, as discussed in this report.

Considering this summary and conclusions, we do not agree that long-term groundwater remediation is necessary *a priori*, and recommend that first the effects of the remediation of contaminated soil on the aquifer quality should be demonstrated. This would involve a redefinition of the impacted area by a baseline groundwater quality monitoring episode, monitoring water quality throughout the contaminated zone (current definition) after the contaminated soil is excavated. Monitoring would permit evaluation of the effects of source removal, and would confirm that contamination is not migrating from the site. During the monitoring period, changes in aquifer quality would be evaluated at regular intervals and the ultimate remediation objectives would be reviewed, reconsidered, and revised, as necessary. We recommend that a monitoring period of two years following soil (source) removal, with quarterly sampling episodes, would provide the necessary data. If groundwater quality does not improve during the monitoring period, or if the compounds begin to migrate toward an off-

site receptor, the need for groundwater remediation would be re-assessed, and would consider the findings of the additional investigations recommended in the RI, the FS, and in this report.

1

GROUND WATER QUALITY 1989. FOR LEAD NL INDUSTRIES, INC. SITE



- LEGEND**
- PLANT AREA
 - STREAM
 - PROPERTY LINE (APPROX.)
 - PLUME DELINEATION BASED ON USEPA ACTION LEVEL OF 10000 FOR LEAD
 - EXISTING CULVERT
 - UPDATED TO REFLECT 1990 DATA

- 2" WELL (TESTED PAIR) AND DESIGNATION
- 4" WELL AND DESIGNATION
- ESTIMATED PLUME DELINEATION
- ➔ GROUND WATER FLOW DIRECTION

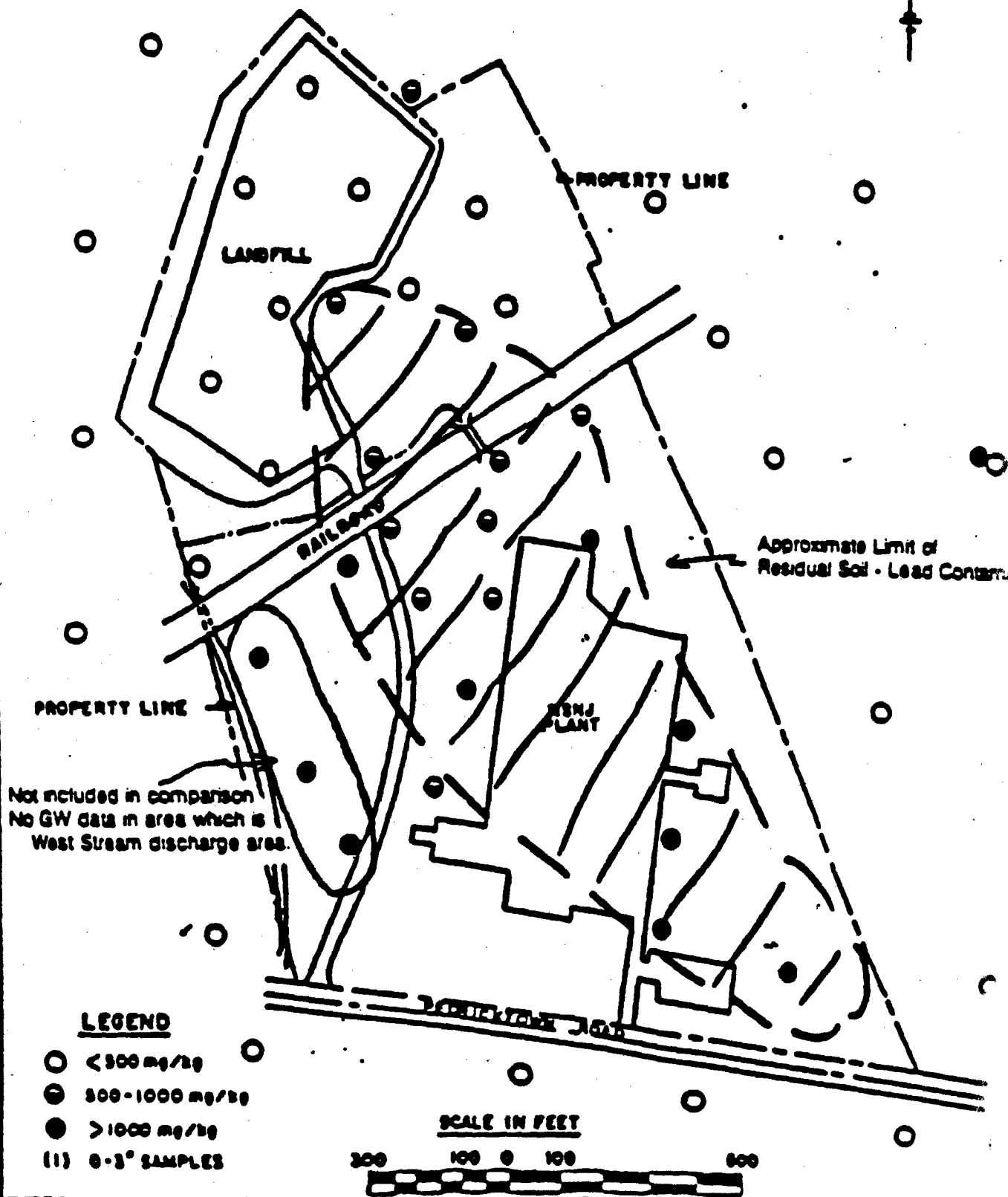


Langan
Engineering and Environmental Services, Inc.

ESTIMATED EXTENT OF
GROUNDWATER CONTAMINATION

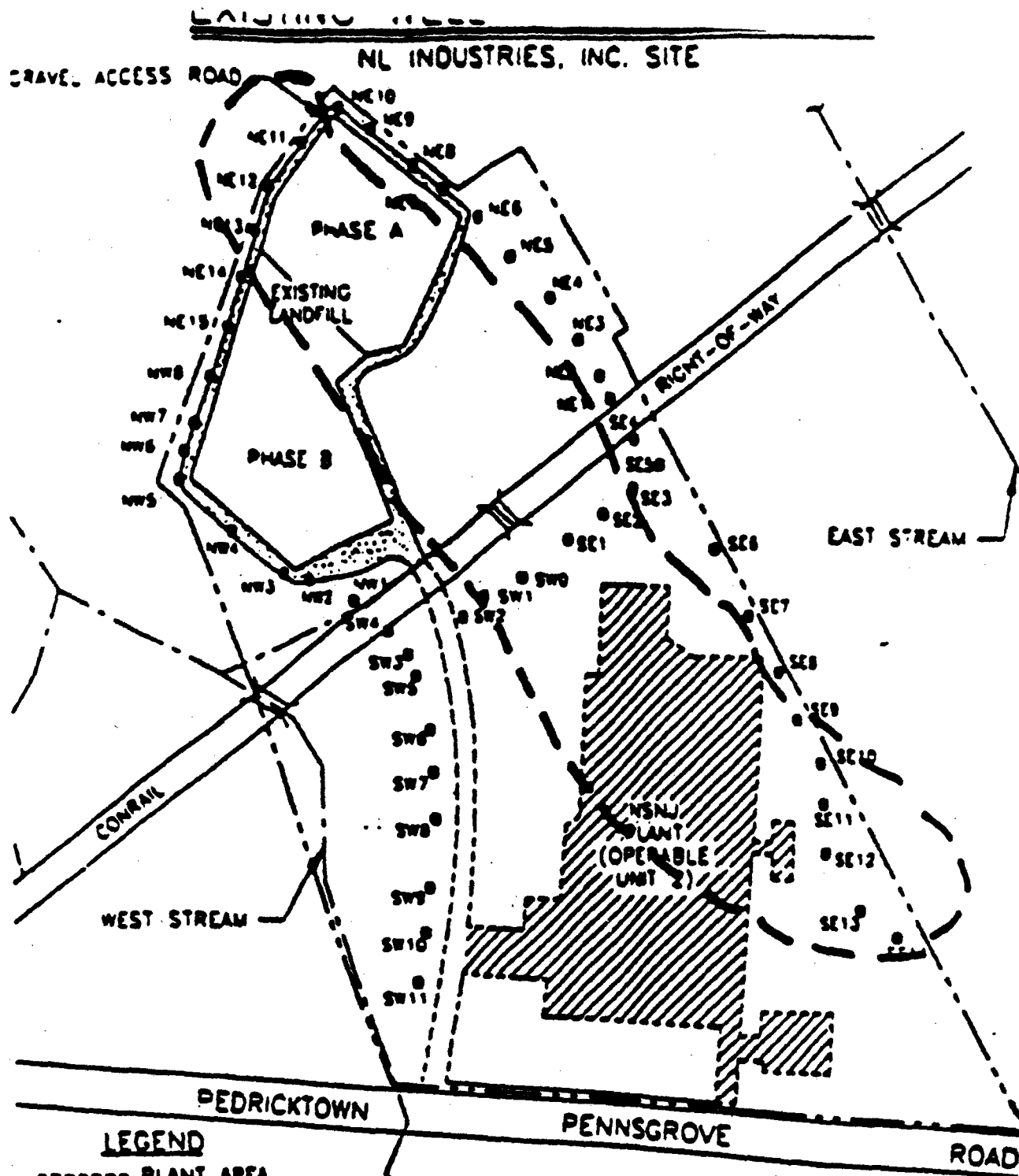
NO. 3520701 SCALE NTS 1/2" = 100'

NSNJ INC / NL SITE SURFACE SOIL ANALYSES⁽¹⁾



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**DISTRIBUTION OF
LEAD IN SOIL**



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**SCHEMATIC RELATIONSHIP BETWEEN
CONTAMINATED ZONE AND
PROPOSED RECOVERY SYSTEM**

FIG. 3520701 SCALE NTS DATE 11-1-82

APPENDIX A
DOCUMENTS REVIEWED

**PEDRICKTOWN OU-1 SUPERFUND PROJECT
GROUNDWATER INVESTIGATION - REMEDIATION
DOCUMENT REVIEW LIST**

Document Title

Remedial Investigation, National Smelting of New Jersey, Inc./NL Industries, Inc. Site

March 1991 - O'Brien and Gere

**Vols: I. Report, Tables, Figures
II. Appendices, Exhibits
III Appendices R-U
IV Appendices V-W**

**Final Feasibility Study - NL Industries, Inc. Site
1993 - O'Brien and Gere**

**Addendum to the Final Feasibility Study Report
NL Industries, Inc. Superfund
Operable Unit One
(Undated - No preparer Listed)**

**Superfund Proposed Plan
NL Industries, Inc.
Operable Unit One
U.S. EPA - July 1993**

APPENDIX B

EVALUATION OF THE EFFICIENCY OF USING INTERCEPTOR WELL NETWORK AS A GROUNDWATER RECOVERY SYSTEM

APPENDIX B

EVALUATION OF THE EFFICIENCY OF USING INTERCEPTOR WELL NETWORK AS A GROUNDWATER RECOVERY SYSTEM

Langan estimates that of the proposed 350,000 gal. which would be extracted, approximately 193,000 gallons (55%) would be from areas outside the contaminated zone. The basis for that estimate is presented below.

The locations of the existing perimeter-interceptor well points are depicted on the accompanying figure. Also shown is the extent of the contaminated zone, as of 1969.

Using the interceptor well spacing as our guide, we assumed a radius of influence for each well of approximately 60 feet. Such radius was drawn, and the combined area of drawdown was superimposed on the figure (shaded area).

Because many of the wells are not aligned along the hydrologic gradient with the contaminated zone, their capture area would include groundwater from outside the contaminated area. Our estimate of the actual capture potential of each well, expressed as a percentage of water pumped, is provided in the ensuing table.

Well Nos.	Percentage of Uncontaminated Water	Volume (g)
NE 11-13; SW 4; SW 9; SW 1; SW 2; SW 9 - 17	0	0
NE 1-10; SE 3-8; SW 2; NE 14	50	64,800
NE 15; NW 1-8; SW 3-11	100	129,600
TOTAL		194,400

Total volume / 24 hours = 352,800

Total from Uncontaminated = 194,400 = 55%

Total from Contaminated Area = 158,400 = 45%

Because of dilution, it is not possible to estimate the influent concentrations, and of equal difficulty to design a treatment system of the proper capacity and operation specifications.

Efficacy of Proposed Recovery System	on TDS and PCB's	as to BOD
Predicted 99-1:1 G.W. Remediation	on _____	on _____

/ = Langan

Langan estimates that of the proposed 300,000 gpd which would be extracted, approximately 193,000 gallons (55%) would be from areas outside the contaminated zone. The basis for that estimate is presented below.

The locations of the existing perimeter-interceptor well points are depicted on the accompanying figure. Also shown is the extent of the contaminated zone, as of 1987.

Using the interceptor well spacing as our guide, we assumed a radius of influence for each well of approximately 60 feet. Such radius was drawn, and the combined area of drawdown was superimposed on the figure (shaded area).

Because many of the wells are not aligned along the hydraulic gradient with the contaminated zone, their capture area would include groundwater from outside the contaminated area. Our estimate of the actual capture potential of each well, expressed as a percentage of water pumped, is provided in the ensuing table.

Well Nos.	Percentage of Uncontaminated water	Volume (gpd)
NE 11-13; SW 1; SW 9; SE 1; SE 2; SE 9 - 14	0	0
NE 1-10; SE 3-8; SW 2; - NE 14	50	64,800
NE 15; NW 1-8; SW 3-11	100	129,600
TOTAL		194,400

Total volume / 24 hours = 352,800

Total From Uncontaminated = 194,400 = 55%

Total From Expected Area = 158,400 = 45%

Because of dilution, it is not possible to estimate the influent concentrations, and of equal difficulty to design a treatment system of the proper capacity and operation specifications.

<u>Efficacy of Proposed Recovery System</u>	by <u>LDG</u> <u>2/10/88-09-93</u>	no. to <u>352,801</u>
<u>Pedricktown OU-1 G.W. Remediation</u>	on <u> </u> date <u> </u>	best <u>1</u> of <u>2</u>

/ = Langan

● ● ● ● ● ●

SAVE ACCESS ROAD



- ## COMBINED RADI OF INFLUENCE

EXISTING CULVERT 400

0 400 800



NO. 3620701 | NAME NYS | BIRTH

• • • • •

PAVE ACCESS ROAD



- 1

116 00

Janet D. Smith
Associate General Counsel

NL

September 17, 1993

BY HAND

Mr. Michael Gilbert, Project Manager
U.S. Environmental Protection Agency
Emergency & Remedial Response Division
26 Federal Plaza, Room 720
New York, New York 10278

Re: Comments on U.S. Environmental Protection Agency
Proposed Plan for Operable Unit One, National
Smelting of New Jersey/NL Industries, Inc. Site,
Pedricktown, Salem County, New Jersey

Dear Mr. Gilbert:

This letter sets forth the comments of NL Industries, Inc. on the U.S. Environmental Protection Agency's July 1993 Proposed Plan for Operable Unit One of the National Smelting of New Jersey/NL Industries, Inc. Superfund Site, Pedricktown, Salem County, New Jersey (hereinafter, the "Pedricktown Site.") In summary, the comments address the following topics: (1) the inappropriate selection of 500 parts per million as the cleanup level for lead-in-soil at the site; (2) the premature and unwise decision to dredge stream sediments north of U.S. Route 130; (3) the erroneous choice of soil washing, an unproven technology, as the remedial alternative for soil; and (4) the exclusive selection of the on-site streams as the discharge point for treated groundwater, rather than considering both the streams and the Delaware River viable discharge options. For these reasons, the Proposed Plan is inconsistent with the National Contingency Plan ("NCP"), 40 C.F.R. Part 300, arbitrary, capricious and not in accordance with law, including the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. §9601 et seq. We also submit comments on the Phase V removal action approved by the U.S. Environmental Protection Agency in conjunction with the Proposed Plan.

NL Industries, Inc.
Office of General Counsel
445 Park Avenue, New York, New York 10022 Tel. (212) 421-7204

Michael Gilbert, Project Manager
U.S. Environmental Protection Agency
September 17, 1993
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I. There Is No Basis for the Selection of 500 Parts Per Million As the Cleanup Criterion for Lead-in-Soil

The Proposed Plan states that the cleanup criterion for lead-in-soil is based on the U.S. EPA's "Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites"¹ ("Interim Guidance"), a U.S. EPA model that is used to evaluate potential lead exposure of children, and the Ecological Assessment performed for the Pedricktown Site. None of these supports the selection of the cleanup level set forth in the Proposed Plan. Further, a site-specific evaluation of lead exposures conducted as part of the baseline Risk Assessment performed for the Pedricktown Site indicates no adverse health effects from exposure to lead.

A. The Interim Guidance for Lead Cleanup Does Not Apply to the Pedricktown Site

The Interim Guidance recommends using a cleanup level for lead-in-soil in residential areas within the range of 500 to 1000 parts per million ("ppm"). This guidance is intended to protect human health in residential settings, but it focuses particularly on children, the most lead-sensitive portion of the population. Since the 500 to 1000 ppm cleanup range of the Interim Guidance is a recommendation for residential settings, it does not apply to the Pedricktown Site, an industrial property, where children are not found.

The Interim Guidance clearly specifies that a lead-in-soil cleanup range of 500 to 1000 ppm only applies "when the current or predicted land use is residential." The Pedricktown Site property is part of an area zoned for development as an industrial park. This area includes present and past operations of B.F. Goodrich, Airco, Browning-Ferris Industries, Exxon a cogeneration plant, and others. Given the industrial nature of the site and the zoning restrictions on its future use as anything other than industrial, it is inappropriate to conclude that the site will be either used for residential development or frequented by children. Therefore, the Interim Guidance cannot form the basis for a cleanup criterion for lead at the site, except to suggest that because of its industrial nature the site cleanup criterion for lead-in-soil should be above 1000 ppm.

¹ The Interim Guidance is set forth in the U.S. Environmental Protection Agency's OSWER (Office of Solid Waste and Emergency Response) Directive #9355.4-02, September 7, 1989.

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The implicit assumption of future residential use of the Pedricktown Site contained in EPA's application of the Interim Guidance to the site is inconsistent with recent testimony provided by EPA Deputy Administrator Robert Sussman at Congressional oversight hearings relating to the selection of remedies for Superfund sites. At the June 23, 1993 hearings, Mr. Sussman stated that EPA is now moving in the direction of assuming that the present land use will be the future land use unless there is persuasive information which is presented that shows current land use is likely to change.² Since the Pedricktown Site is zoned for industrial use and is surrounded by parcels similarly zoned and currently used for industrial purposes, continued industrial use should be assumed in carrying out a risk assessment. Consequently, site-specific considerations warrant the use of lead-in-soil cleanup levels above the higher end of the residential cleanup range of 1000 ppm.

B. EPA's Model of Childhood Lead Exposure Should Not Be Applied to an Industrial Site

In recent years, EPA has been developing and calibrating a model that predicts blood lead levels in children based on exposure to lead-contaminated media in lieu of its older, conventional risk assessment procedures for other pollutants. Since the model is intended to be applied to children in typical residential settings, it should not be applied to the Pedricktown Site. Moreover, the model is still under development and is being refined.

Nonetheless, available information on the model actually reinforces the conclusion that a lead-in-soil cleanup criterion for the Pedricktown Site based on risk considerations would be significantly higher than the 500 ppm selected in the Proposed Plan. EPA has circulated a memorandum³ that states that if default assumptions are used with respect to lead exposures, a lead-in-soil cleanup criterion of 500 ppm would always be predicted by the model. These default assumptions represent exposure from regular contact and ingestion of lead, which is

² See also Superfund Administrative Improvements, Final Report, June 23, 1993, at pp. 24-5.

³ OSWER memorandum "Update on OSWER Soil Lead Cleanup Guidance" (Don Clay, U.S. Environmental Protection Agency, August 28, 1991).

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substantially higher than the intermittent, low level exposure that might occur from occasional trespassing onto the Pedricktown Site by children. Therefore, lead cleanup criteria for the site would be significantly higher than 500 ppm, and should be above the Interim Guidance range of 500 to 1000 ppm recommended for in residential areas.

C. The Ecological Risk Assessment Does Not Support a 500 Ppm Lead Cleanup Criterion

The Proposed Plan provides that "EPA's site-specific Ecological Assessment concluded that 500 ppm of lead is the appropriate remedial action objective for site soils located in wetland areas, as well as stream sediments." However, a review of the Ecological Assessment indicates that several overly-conservative assumptions were used in the estimation of exposures for the target species, and, as acknowledged in the assessment, considerable uncertainty was associated with the literature-derived toxicological data applied in the assessment. As a consequence, by compounding inappropriate assumptions and uncertainties, the Ecological Assessment predicts that an unacceptable risk from exposure to lead exists at virtually any lead concentration in soil. This failure of a "reality check" significantly limits the use of the Ecological Assessment for developing a soil cleanup criterion. Thus, the 500 ppm lead cleanup criterion is arbitrarily selected and is not supported by the results of the Ecological Assessment.

During the development of the work plan for the Ecological Assessment and thereafter as it was carried out, NL Industries and its consultant ENVIRON provided extensive comments on the Ecological Assessment. A copy of the comments is attached hereto as Attachment 1. The following highlights the key criticisms of EPA's reliance upon the Ecological Assessment in risk management decisions at the Pedricktown Site:

- The Ecological Assessment does not establish a strong or consistent correlation between lead levels in soils and in earthworms and white-footed mice. Significantly, the field investigation failed to demonstrate that concentrations in earthworms decreased with decreasing exposure to lead. This failure severely limits the use of the dietary exposure-based risk assessment results to establish a lead-in-soil cleanup criterion at the site. Target species such as the woodcock whose risk supposedly derives from ingestion of earthworms may not be at risk at all if the level of lead in earthworms is not directly proportional to the level of

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lead-in-soil. This inadequacy of the field investigation, the foundation of the Ecological Assessment, largely invalidates its use as support for the lead-in-soil cleanup criterion selected in the Proposed Plan.

- In developing cleanup criteria that are proposed as maximum limit values, EPA has failed to consider that risks are derived from exposures of biota to mean soil levels within their home range. For example, if 500 ppm is established as a cleanup level for lead-in-soil (based on exposures of biota to soils that average 500 ppm), then once the site is remediated to a 500 ppm maximum residual level, then the actual exposures will be to soils in the species' home range that average less than 500 ppm. Thus, exposure should be recalculated taking into account the post-remedial reduction in the mean soil levels within a species' home range. This correction would make a major difference at the Pedricktown site, where the elevated concentrations requiring remediation constitute approximately 30 percent of the home range of the woodcock, one of the species to be protected by the proposed cleanup. Remediation of this area with the highest soil levels would significantly reduce the mean soil levels in the home range of the target species and therefore the mean exposure and risk would decrease significantly.
- If the hazard quotient "should be interpreted based on the severity of the effect reported and the magnitude of the calculated quotient," as the Ecological Assessment states, then even the effects on the woodcock, which have the highest hazard quotient estimates, would be further reduced because the toxicity endpoints (e.g., reductions in ALAD activity, hemoglobin and hematocrit, and in brain weight of nestlings) are not generally considered as severe as the ecological endpoints of survival, reproduction or growth.
- The use of scientifically justifiable alternative values for some of the exposure parameters (e.g., home range) and toxicity thresholds would reduce the hazard quotient estimates developed in the Ecological Assessment. For example, the available toxicity data indicate that a toxicity threshold of 8.25 mg/kg/day or higher is justified for the woodcock rather than the 4.1 mg/kg/day value that was applied. Thus, the Ecological Assessment proportionately overpredicts risks for the woodcock, and a cleanup criterion derived from consideration of risks to the woodcock would be proportionately too low.

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**D. The Risk Assessment for Lead Shows
No Potential for Adverse Health Effects**

A baseline Risk Assessment was conducted for the Pedricktown Site to evaluate the health effects associated with exposure to soils and ground water affected by the site. This Risk Assessment evaluated the future use of the site as industrial, and concluded that there would be no potential adverse health effects from exposure to lead in soils for a worker population. Therefore, EPA's proposed selection of the 500 ppm cleanup criterion is contrary to the results of the risk assessment, and has not been substantiated by any other quantitative characterization of risks at the site.

II. The EPA Proposal to Clean Up Sediments North of U.S. Route 130 Is Premature, Unwarranted and Could Have Severe Adverse Environmental Impacts

The Proposed Plan calls for remediation of stream segments located north of U.S. Route 130 ("Route 130"). However, commencement of this work is unwarranted by the present record, and ignores several important factors concerning these streams.⁴ We recommend the adoption of Stream Alternative A for the sediments situated north of Route 130.

First, the water quality of the stream segments north of Route 130 should dramatically improve as a direct result of removal of the sources of the contamination. In particular, the Pedricktown Site Operable Unit Two surface cleanup of substantial sources of runoff from the Site, including the removal of lead-bearing slag, waste piles and pooled surface water, is now complete. This work has eliminated sources that contributed to the presence of lead in the waterways north of Route 130. Further, the anticipated removal of sediments south of Route 130, where significantly higher levels of lead are found in the sediments than are present to the north, should have an ameliorating effect on stream and river beds sediments north of Route 130. In addition, the ongoing flow and deposition of new sediments from upstream to downstream, from south to north, a process that is continual in the stream, will create a natural cap on top of the sediments north of Route 130.

⁴ The comments summarized in this Section II. were submitted on NL's behalf by O'Brien & Gere to the U.S. EPA in July, 1992. See Attachment 2.

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Second, the Proposed Plan fails to take into account the negative impacts of remedial action in the stream segments north of Route 130. These stream segments are too large to be diverted or dewatered, the techniques that can be used in the stream south of Route 130. The proposed excavation and dredging will be severely detrimental to the aquatic environment. Such dredging is likely to result in downstream transport of entrained, lead-bearing sediments and redistribution of contamination. Sediment resuspension and slump during the dredging might serve only to increase the concentration of lead in the water column. Dredging these stream sediments would be destructive to the existing ecosystem, increasing turbidity and decimating the benthic flora and fauna. This was made abundantly clear by the high mortality reflected in the results of the bioassay studies upon sediments from the stream conducted by Dr. Sprenger of the U.S. EPA as part of the field investigation of the Ecological Assessment. Such remediation should not be undertaken without first awaiting the outcome of the sediment cleanup south of Route 130, and allowing for the passage of time so that the newly cleaned sediments may form a cap. Thereafter, if monitoring demonstrates that stream sediments north of Route 130 contain levels of lead that are too high the decision to cleanup those sediments could be revisited.

Finally, while weighing the pros and cons of these invasive cleanup measures in the stream north of Route 130, the Agency should also consider that the sediments are affected by sources of lead not related to the Site. Elevated lead levels are found in two tributaries which discharge into the area north of Route 130 but do not receive runoff from the Site. These two tributaries were sampled by EPA (Samples EPA-1 and EPA-6.) Most likely, an upstream source affects these tributaries and is also contributing to water quality north of Route 130. In addition to the tributaries, runoff from the Army Corps of Engineers' dredge spoils piles will continue to enter the channels north of Route 130. The contribution of the tributaries and the dredge spoil disposal by the Army Corps may result in recontamination of sediments north of Route 130. Thus, any cleanup of sediments by dredging north of Route 130 could be physically destructive of habitat, and may be futile due to contribution by other sources.

For all these reasons, we believe that the correct remedial alternative for the stream sediments north of Route 130 is Sediment Alternative A. This alternative, which includes monitoring of stream water quality, would be most protective of the aquatic environment as it would allow time for the related cleanup activities to proceed, positively affecting the stream sediments north of Route 130. Further, this Alternative would

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not prematurely disturb the benthic ecosystem with destructive techniques that could be unnecessary, and in the long run, furnish no net environmental benefit.

III. Solidification/Stabilization Technology is A Superior Choice Because Soil Washing Technology is Unproven At Sites Comparable to Pedricktown, and Available Data Suggests That It Is Expensive and Will Fail at the Pedricktown Site

The Proposed Plan recommends modified Alternative Soil D as the remedial technology for contaminated soil at the Pedricktown Site. However, soil washing has not been fully implemented to date for remediation at lead battery or smelting sites, and available data suggests that it will fail at sites with soils that contain large portions of fine clays and high levels of humic material. In contrast, the soil treatment technology we recommend, solidification/stabilization, is a proven and widely used remedial technology for lead. It is also more cost-effective than soil washing, and does not result in the potential introduction of additional pollutants. Soil washing may even increase the volume of contaminants at the Pedricktown Site.

A. Overview of Soil Washing

Soil washing is a hybrid of remedial technologies. It may include the use of a washing solution, such as water, surfactants, chelating agents, or acidic solutions to achieve necessary particle size and separation and to extract contaminants from the soil. The washing solution and contaminated soil are mixed together, mechanically agitated and separated again. After this treatment, the soil is either returned to the site, treated further or disposed of offsite. The critical factor that determines the success of soil washing is whether it can extract sufficient lead to render the soil nonhazardous and reduce lead concentrations below applicable response objectives.

Under specific circumstances, soil washing has shown promise in the treatment of heavy metals, although not for lead. The technology works best on coarse-grained sandy soils, but is only marginally effective for remediating silty soils (more effective for treating a mix of sandy/silty soils than for a mix of silty/clay soils), and ineffective for fine clay soils.

Since soil washing is not a proven technology, its performance history at lead battery sites comparable to the

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Pedricktown Site must be taken into account in determining its implementability for the Pedricktown Site. This performance history is reviewed in the next section.

B. Review of Soil Washing Experience and Literature Suggests That the Technology is Ill-Suited for Pedricktown

1. Selection of Control Technologies for Remediation of Lead Battery Recycling Sites, EPA/540/2-91/014, July 1991

This U.S. Environmental Protection Agency work reviews remedial options for lead contaminated soils including solidification/stabilization and soil washing/acid extraction. The document states that solidification/stabilization has been proven effective at full scale in remediating lead contaminated soils. The document further states that, while soil washing has been shown to be effective on a bench scale, it has not been successfully demonstrated at full scale. The Agency cites two full scale demonstrations, Lee's Farm in Woodville, Wisconsin and the Arcanum site in Troy, Ohio, where soil washing of lead contamination was attempted. In both cases, EDTA, a chelating agent, was used to promote the removal of lead from solution. Neither site was sufficiently cleaned up by the soil washing so soils at both sites required subsequent treatment by solidification/stabilization to complete the remediation. According to the paper, the majority of the problems with soil washing at these sites were related to materials handling. Clogging of filters by fine silty particles and excessive loading of suspended solids into the EDTA recovery system were nagging problems. These problems foreshadow what could be expected at sites with fine sandy soils or silty/clay soils, such as Pedricktown.

The paper also refers to the U.S. Bureau of Mines acid leaching process which used nitric acid and pretreatment to remove lead from soil. The Bureau of Mines has not yet completed their work or evaluated their process on a full scale. The paper concludes that soils which are high in clay, silt, and/or humic material are difficult to treat by soil washing, and that soil washing has not been effectively demonstrated on a full scale.

Review of this paper suggests that soil washing makes a poor choice for Pedricktown, in light of the soil composition, and leads to the conclusion that solidification/stabilization is a better, more reliable option.

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2. Control Technologies for Remediation of Contaminated Soil and Waste Deposits at Superfund Lead Acid Battery Recycling Sites, Michael Boyer, et al., U.S. EPA, Edison, N.J. July 1992.

This U.S. Environmental Protection Agency paper states that full scale remediation using soil washing has not been successfully demonstrated even though bench scale studies have been favorable. The paper concludes that one of the chief limiting factors for soil washing performance is the physical nature of the soils, and that soils high in clay, silt or fines have proven difficult to treat. The paper also refers to the full scale soil washing failures at Lee's Farm in Woodville, Wisconsin, the ILCO site in Leeds, Alabama, and the U.S. Bureau of Mines bench scale studies.

The Bureau of Mines studies did indicate that high levels of lead removal can be achieved with acid washing. However, it is highly undesirable to introduce acid into the environment at a former lead smelter site such as Pedricktown. Moreover, the Bureau of Mines results have not been duplicated at full scale. The Bureau of Mines studies also indicated that soil washing with water and EDTA did not remove significant amounts of lead from any of the soil fractions.

Written a year after the July 1991 U.S. Environmental Protection Agency paper on soil washing, this later work does not hold out promise that soil washing has been improved into a remedial technology that will work well on lead-contaminated soils such as those at the Pedricktown Site.

3. Soils Washing, Bergmann USA/Applied Environmental Technologies Inc., Michael Mann and Jill Besch, August 1993

The organization performing this work is Applied Environmental Technologies Inc. (AET), an Dutch-American joint venture. We view the results reported as less reliable than those reported by the U.S. Environmental Protection Agency, since a company in the remedial technology business may be inclined to present a rosy picture of their abilities for marketing purposes. We include the results reported here for completeness.

The article reports that soil washing technology has been successfully employed by AET at five sites in the Netherlands. All of these projects were performed on coarse, sandy soils with initial soil concentrations in the range of 1,000 ppm lead.

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According to AET, treatment efficiencies in the range of 80-90% have been demonstrated on these projects.³

AET has designed a soil washing remediation project in Winslow Township, New Jersey that is underway. This is the first full scale remediation of soils contaminated by heavy metals using soil washing in the United States. Soils at this site are primarily coarse sands. Contaminants of concern are chromium, copper, and nickel at concentrations of up to 500 ppm, 8,000 ppm, and 3,500 ppm respectively, but not lead. Initial data suggests treatment efficiencies are in the 80-85% range. AET claims that its process is effective in soils with less than 10% by weight of humic material and 400 mesh or larger soil particles, but warns that soils not meeting these criteria may not be amenable to soil washing.

Soils at the Pedricktown Site sharply contrast with the soils reported to be suitable for treatment by AET. Pedricktown soils contain fine sand, silt, clay and a large fraction of humic material, the type of material reported to clog treatment filters in the U.S. EPA reports. Moreover, Pedricktown Site soils have initial lead concentrations ranging up to 12,700 ppm, as opposed to the average of 1000 ppm reportedly treated by AET in the Netherlands. Thus, treatment by soil washing, even if it could be performed, is unlikely to produce treated soil meeting the 500 ppm lead remedial objective.

Treatment costs using the AET process are typically in the \$150 to \$250 per ton range depending on soil quantity and characteristics.

4. Soil Washing Test Performed on Pedricktown Site Soils by the Center for Hazardous Materials Research

The Center for Hazardous Materials Research reportedly subjected a sample of soils from the Pedricktown Site to soil washing and achieved lead concentration reduction from 30,000 ppm to "about" 1,000 ppm. The test conducted under laboratory conditions was unable to reduce levels of lead-in-soil below 1000

³ We report upon what AET has presented, although we are unable to corroborate their work. On a cautionary note, it is difficult to extrapolate the results obtained in the Netherlands to what might occur in the U.S. due to differences in the regulatory environment.

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ppm and therefore does not demonstrate that the designated treatment objective for the Pedricktown Site of 500 ppm lead can be achieved at full scale. Although we were not afforded the opportunity to observe this sampling or duplicate the results, we believe that it is likely that only soils from the coarse sandy fraction at the Pedricktown Site were subjected to the test, since otherwise the results would be inconsistent with the larger official studies reported above by the U.S. EPA.

C. Conclusions Derived From Review of U.S. EPA Reports Suggest That Soil Washing Will Fail at the Pedricktown Site

A review of available literature on soil washing shows that there have been numerous failures in applying soil washing at Superfund sites, and in laboratory efforts to develop the process. The literature does suggest that the technology may succeed when the soil to be treated possesses certain characteristics that make it more susceptible to washing, such as being coarse and sandy. Soil washing has not been demonstrated as effective at full scale in remediating lead contaminated soils in the United States.

While soil washing can be an effective remedial technology under ideal soil conditions, the feasibility of soil washing for the Pedricktown Site is highly questionable. Soils at Pedricktown contain fine sand, silt, clay and a considerable fraction of humic material. Such soils have been repeatedly shown to be difficult to treat with soil washing. Past attempts to treat such silts by soil washing have resulted in the occurrence of materials handling problems which resulted in the abandonment of soil washing as a remedial technology at full scale. Further, soils at the Pedricktown Site contain levels of lead as high as 12,700 ppm, lending a high degree of difficulty to the treatment process. It would be highly undesirable to complicate the environment at Pedricktown by the introduction of acids to promote better soil washing.

D. Soil Washing is Inferior to Solidification/Stabilization When the Statutory Criteria for the Selection of Remedies at Superfund Sites Are Applied

Application of the Superfund criteria for remedy selection to soil washing and solidification/stabilization results in inferior marks for soil washing when judged on implementability, cost, long and short term effectiveness and reduction in

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toxicity, mobility and volume. Soil washing has not been successfully implemented at full scale for remediation of lead contaminated soils at sites similar to the Pedricktown Site. To the contrary, sites that are comparable, such as Leed's Farm, Arcanum and ILCO resulted in large-scale remedial failures. Portions of these cleanups had to be completed using solidification/stabilization. Reports by the U.S. EPA in the literature strongly suggest that soil washing would fail at Pedricktown.

Since soil washing has not been successfully implemented at full scale for remediation of lead contaminated soils at lead battery sites, extensive treatability studies would be required to design a workable remedy. Parameters to be examined would be expected efficiency, type of washing solution, optimum contact time, and secondary waste generation quantities and characteristics. The particular characteristics and contaminant concentrations of the wastes, soil types and contaminant concentrations at the Pedricktown Site would have to be examined during these studies. Given the heterogenous nature of the Pedricktown soils and the relatively high concentrations of contaminants, extensive treatability studies would be required in the remedial design phase. As acknowledged by the U.S. EPA⁶, there must be economies of scale involved in application of the soil washing technology in order to make it cost-effective. But since the quantity of soil that could be washed at Pedricktown is a relatively small amount, approximately 10,000 cubic yards, no economy of scale would exist, thereby rendering soil washing a remedy that scores low marks for both implementability and cost-effectiveness.

Even if soil washing were feasible, it would still be expensive. Unit costs for soil washing of heavy metals are typically \$150 to \$250 per ton for full scale remediations. Unit costs for solidification/stabilization are typically in the range of \$100 per ton. A unit cost ratio of soil washing solidification/stabilization of 1.5/1 is typical for remediation. This ratio is actually somewhat higher for the Pedricktown Site according to the EPA figures in the Proposed Plan: the costs of Soil Alternatives D and F, as modified by the U.S. EPA, are projected as \$10,712,000 and \$6,450,000 respectively (a cost ratio of 1.65/1). Thus, soil washing, even if it were readily

⁶ "Guide to Conducting Treatability Studies Under CERCLA: Soil Washing", EPA/540/2-91/020A, September 1991.

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implementable, would be far more expensive than solidification/stabilization at the Pedricktown Site.

If soil washing is unable to extract the lead to levels that meet response objectives, soil washing will be ineffective in reducing toxicity, and would in fact increase volume. And if the residual lead concentrations are not low enough for the soil to be used as replacement fill material, washed soil would be replaced in the on-site consolidation pile. Thus, the soil washing would have exacerbated conditions at the Pedricktown Site by increasing volume.⁷ Moreover, the sludge and chemicals created in the soil washing process would also require disposal, thereby further increasing the total amount of material requiring treatment and disposal.

As to long-term and short-term effectiveness, soil washing trials at Lee's Farm and Arcanum site showed that soil washing technology is ineffective at lead battery sites. Past experience further demonstrates that soil washing has limited effectiveness at sites with fine silty or clay soils, or soils with appreciable quantities of organic matter. The ultimate success of soil washing does not lie in its ability to extract lead, but in removing enough lead to meet remedial objectives. Aqueous washes have been largely unsuccessful in this regard, with limited success experienced at the bench scale level using acid leaches. However, acid leaches have associated problems including proper worker training to handle acids, necessity for specialized acid-resistant equipment for the acid leaching process and the further treatment of lead sulfate sludge that is produced. In general, the historical lack of demonstrated effectiveness of soil washing at lead sites casts grave doubt upon its ability to meet remedial objectives at the Pedricktown Site.

IV. The Agency Should Retain Two Options for Groundwater Discharge Rather than Selecting Only the Stream Discharge Point

NL Industries has studied the September 15, 1993 "Review and Comments on Groundwater Investigation and Remediation Strategies"

⁷ While there may be some small benefit from the reduction in mobility of the washed soil disposed in the consolidation pile, given that the pile must be lined and capped anyway and the material has inherently low solubility, the mobility of the lead is low even without treatment. Thus, the incremental benefit from soil washing is marginal at best.

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prepared by Langan Engineering and Environmental Services, Inc., submitted to the U.S. EPA as commentary on the Proposed Plan. NL joins in the comments to the extent that they endorse further groundwater monitoring and the re-examination of the need for groundwater remediation.

If and when the EPA determines to proceed with groundwater remediation as set forth in the Proposed Plan, NL believes that the Agency should preserve two options for the discharge of treated groundwater. The Proposed Plan recommends the discharge of treated groundwater to the East or West Streams rather than to the Delaware River. This selection is premised on the assumption that a Delaware River discharge might be delayed or blocked by the need for the construction of a pipeline crossing the railroad tracks, Route 130 and several private properties, and would require a NJPDES permit. We believe that these logistical issues could be readily resolved, and would not delay the groundwater cleanup. NL recommends that the Proposed Plan be modified to preserve Groundwater Alternatives G-1 and G-2 inasmuch as Alternative G-2 may be more implementable and cost effective, but the alternatives are otherwise comparable. We recommend that the final choice of discharge point be made during the remedial design phase.

A. Logistics and Access

There is sufficient space on the Pedricktown Site north of the railroad right-of-way and south of the existing landfill to accommodate a treatment plant of the type and size anticipated for treating groundwater at the site. In fact, the existing well point system piping network extends under the railroad to this location. Thus, a treatment plant could be sited north of the railroad right-of-way, close to the Delaware. The outfall could be constructed under Route 130, since the jacking of water pipelines under major highways is routine construction practice. The requisite permit from the New Jersey Department of Transportation should be readily obtained.

NL has commenced the process of exploring whether access agreements may be obtained to construct a pipeline across the private properties situated between the north side of the Pedricktown Site and the Delaware River. Both B.F. Goodrich¹ and

¹ B.F. Goodrich has already demonstrated the feasibility of such a pipeline in that it currently runs a discharge pipeline from its facility to the Delaware River.

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Corrosion Control have favorably responded to NL's overtures. A copy of correspondence to these companies is attached as Attachment 3. Based on discussions with these companies, we believe that access for a pipeline easement could be obtained in a timely fashion and would not delay construction of the outfall.

B. Water Discharge Permit Requirements

Constructing a treatment plant and outfall as proposed in Groundwater Alternative G-2 would require water discharge permits, a New Jersey Pollutant Discharge Elimination System (NJPDES) Discharge to Surface Water permit and a Treatment Works Approval. The NJPDES permit is required prior to discharging treated groundwater to the Delaware River. The permit would specify flow and effluent limitations for contaminants. Our review of Recommended Water Quality Criteria for Toxic Pollutants for the Delaware River Estuary (January 1992), confirmed by representatives of the Delaware River Basin Commission, indicates that lead discharge levels for the proposed treatment plant could be up to 63 parts per billion and be protective of the aquatic environment for the Delaware River Basin's Region V.⁹ This remedial objective should be more implementable and cost effective than a discharge to the East or West Stream, where lead would have to be treated to 10 parts per billion or less. We do not anticipate any delay in obtaining a NJPDES permit, since it must be issued six months after the receipt of a complete application.

Several other permits may be required for the Delaware discharge option, and they should be readily obtained. A Treatment Works Approval ("TWA") would be required for the construction of the groundwater treatment plant and outfall. The State of New Jersey is required by law to review and approve a TWA application within 90 days. Additional permits which may be needed (depending on the exact placement of the discharge outfall) include a wetlands permit, a Coastal Area Facility Review Act permit and a stream encroachment permit. All of these permits must be issued within ninety days after receipt of a complete application.

⁹ Upstream of any discharge from the Pedricktown site, the Delaware River receives effluent of 500 mgd from the City of Philadelphia wastewater treatment plant as well as several other significant municipal and industrial discharges. The volume of flow in the River is sufficient to accept these discharges with no degradation.

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The total time for obtaining permits is approximately twelve months, allowing adequate time for completion of the permit applications. Since design of the groundwater treatment system, including treatability studies, should take twelve months, and construction should take twelve to eighteen months, the time needed to secure the necessary permits would not delay the commencement of treatment, since it can occur at the same time as design and construction of the treatment works. Accordingly, the discharge of treated groundwater to the Delaware River is as feasible as a discharge to the East or West Streams in terms of time, permitting and access.

C. Because Alternative G-2 Might Provide a Substantial Cost Savings Over G-1, It Would Be Preferable to Retain Both Discharge Options

Anticipated costs for Groundwater Alternative G-1 are approximately \$1.5 million more than Alternative G-2. These additional costs are primarily attributable to the costs associated with the reverse osmosis required to meet water quality standards in the streams. Thus, G-2 may be both more implementable and less expensive. Since Alternatives G-1 and G-2 are otherwise roughly comparable in meeting environmental objectives, NL recommends retaining both discharge options, and making the final decision during the remedial design phase.

V. The Phase V Removal Action is a Public Works Project Not an Environmental Response Action

The U.S. EPA approved the Phase V removal action for the Pedricktown Site on July 13, 1993, in conjunction with the Proposed Plan for Operable Unit One. The Removal Action Memorandum requested a ceiling increase of \$1,237,700. The Phase V Removal Action is: (1) inconsistent with the NCP, (2) inconsistent with the proposed long term remedial action, and (3) predicated upon a Salem County flood control project rather than an imminent and substantial endangerment to human health, welfare, or the environment.

A. The Phase V Removal Is Inconsistent With The NCP

CERCLA establishes criteria for responding to a release into the environment of any pollutant or contaminant that may present an imminent and substantial danger to the public health and welfare. The criteria include the following:

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1. "Removal actions shall, to the extent practical, contribute to the efficient performance of any anticipated long term remedial action with respect to the release concerned." NCP §300.415(c).

At the Pedricktown Site, all upgradient sources of the contaminant of concern (lead) have not been removed. Surface soils, immediately upgradient of the West Stream, contain lead in excess of 9,000 ppm. These soils are scheduled for remedial action pursuant to the proposed plan for Operable Unit One 1. The excavation of the stream to a depth of four feet may enhance erosion of the upgradient surface soils, resulting in the recontamination of the stream sediments. Accordingly, this removal action is inconsistent with the proposed remedial action. Moreover, the environmental remediation of the East Stream should be carried out at the same time as the West Stream to avoid the inherent waste in remobilization.

2. "Fund financed removal actions, other than those authorized under section 104(b) of CERCLA, shall be terminated after \$2 million has been obligated for the action or 12 months have elapsed from the date that removal activities begin onsite " NCP §300.415 (b) (5).

Funding for Phase I of the Removal Action was approved in 1988. The Phase I Removal Action was completed on May 31, 1989, and the Phase IV Removal Action was completed on June 26, 1992. Accordingly, more than four years have elapsed from the date that removal activities began on site, and more than twelve months since Phase IV was completed. Thus, the Phase V removal contravenes CERCLA and the NCP.

3. "Whenever a planning period of at least six months exists before on-site activities must be instituted ... [t]he lead agency shall conduct an engineering evaluation/cost analysis ("EE/CA") or its equivalent" NCP §300.415 (b)(4), and shall "[p]ublish a notice of availability and brief description of the EE/CA in a major local newspaper of general circulation ... [and] [p]rovide a reasonable opportunity, not less than 30 calendar days for submission of written and oral comments " NCP §300.415(m)(4).

The Agency has had full knowledge of the contaminants of concern in the West Stream sediments prior to the approval of the Remedial Investigation Report on July 8, 1991, providing more

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then ample time for completion of the EE/CA. There has been no notice of availability or brief description of the EE/CA published to date, or opportunity provided for submission of comments pursuant to the above.

4. "Where the responsible parties are known, an effort initially shall be made, to the extent practicable, to determine whether they can and will perform the necessary removal action promptly and properly." NCP §300.415(a)(2).

The Agency has known the identity and location of numerous potentially responsible parties prior to the Phase I Removal Action of 1989, and has not notified any of these parties regarding any phase of the removal actions.

B. The Phase V Removal Action Is A Thinly Disguised Public Works Project

In January 1992, the Salem County Mosquito Control Commission ("SCMCC") commenced excavation of sediments from the West Stream, immediately south of Route 130, depositing those sediments along the northeast bank of the stream. This action was performed to alleviate flooding in upstream farm lands. Due to the distribution of contaminated sediments along the banks of the stream, subjecting the area soils to potential contamination, the EPA required the SCMCC to cease disturbing the contaminated stream sediments. Forced to change course, the SCMCC installed drainage ditches along the north sides of Pennsville-Pedricktown Road and New Road as an alternative measure to reduce the flood potential.

The risk of flooding and sediment redistribution has been greatly diminished by these SCMCC flood control measures. Meanwhile, the EPA performed removal action at the site, and a Focused Feasibility Study which culminated in the performance of Operable Unit Two at the site. Throughout the past year, additional upgradient sources of lead have been removed from the site under Operable Unit Two, further reducing the potential spread of contaminants. Accordingly, the potential risk or threat to health and the environment has been controlled by focusing on both the risks of flooding and of runoff from surface contaminants. Nonetheless, the EPA has chosen to proceed with another phase of its four-year old removal action.

While the U.S. EPA will be removing only the first foot of sediment from the stream, the Agency is voluntarily donating

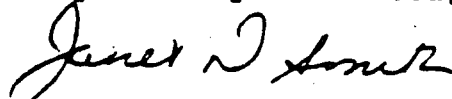
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resources to the SCMCC "stream enhancement" program by excavating to a fourteen foot width in a stream having a present maximum width of approximately five to six feet. The stream widening is dictated only by the SCMCC program, not by any stated environmental concerns. After the U.S. EPA work, the SCMCC will deepen the stream by an additional three feet. The SCMCC, and not the EPA, will be determining stream sediment removal areas by "staking the new route of the widened stream." This demonstrates that the EPA is not determining the specific removal areas based upon any environmental criteria, but is responding to the local flooding fears using federal funds earmarked for Superfund cleanups.

VI. Conclusion

In conclusion, NL believes that there is no basis for the choice of 500 parts per million as the cleanup level for lead-in-soil at the site. Considering the industrial land use of the site, the cleanup level for soils should be greater than 1000 ppm. In addition, the experience of the EPA and other companies with soil washing, an unproven technology with respect to lead cleanups, clearly demonstrates that it is the wrong choice for the remedial alternative for soil at the Pedricktown site. Solidification/stabilization is more cost effective and has proven to be a more reliable and feasible technology at lead sites and should be selected as the preferred alternative. Taking into account the potential adverse impacts of dredging in a water column, NL recommends proceeding with a conservative monitoring program before invading the streambed north of Route 130 with dredging equipment. Similarly, NL joins in the comments of Langan Engineering and Environmental Services, Inc. as to the uncertainty of the need for groundwater remediation at this time, and recommends that when and if groundwater remediation is conducted, the Agency should consider both the streams and the Delaware River viable discharge options. Finally, we believe that the Phase V removal action is unwarranted and motivated by local desires for flood control assistance rather than environmental protection.

Respectfully submitted,

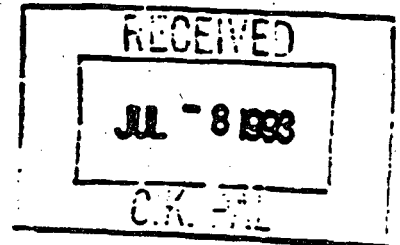

Janet D. Smith

cc: Susan H.S. Monks, Esq.

ENVIRON

July 6, 1993

Chief, Site Investigations and
Compliance Branch
Emergency and Remedial Response
Division - Room 720
U.S. Environmental Protection Agency
26 Federal Plaza
New York, NY 10278



Attention: Michael Gilbert, Project Officer

Re: NSNJ Pedricktown, New Jersey Facility RI/FS

Dear Mr. Gilbert:

We were pleased to receive draft copies of the January *Final Report: Field Ecological Assessment* and the *Ecological Risk Assessment* for the Pedricktown, New Jersey Superfund Site, and to have the opportunity to discuss, on behalf of NL Industries, our initial comments on the drafts with you, Dr. Mark Sprenger and Ms. Kim O'Connell at your offices on March 9, 1993. At the request of NL Industries, ENVIRON prepared the attached report summarizing the comments made at the meeting as well as a few additional comments that were developed following a more thorough review of the documents.

We trust that the comments will be of assistance to you in preparing the final reports. If you have any questions, please contact me at (703) 516-2300.

Very truly yours,

Dan Woltering, Ph.D.
Principal

cc: Paul Harvey, NJDEPE (Three copies)
Dr. Mark Sprenger, U.S. EPA
Evans Stamatakis, U.S. EPA
Steve Holt, NL Industries, Inc.

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COMMENTS ON THE USEPA ECOLOGICAL RISK ASSESSMENT FOR THE NL PEDRICKTOWN SITE

In January, 1993 U.S. Environmental Protection Agency (USEPA), Region II (Environmental Response Branch, Emergency Response Division, Office of Emergency and Remedial Response) released two draft documents concerning the assessment of ecological risk associated with lead contamination at the NL Industries, Inc. (NL) Site, Pedricktown, New Jersey. The first document, *Final Report: Field Ecological Assessment*, describes a series of field investigations to collect empirical data on target receptors and surrogate organisms to be used in a subsequent ecological risk assessment of lead contamination in the vicinity of the NL Site. The report presents data on sediment toxicity, aquatic vertebrate lead levels, earthworm *in-situ* bioaccumulation of lead, small mammal lead contamination, and a terrestrial and wetland habitat assessment. The second document, *Ecological Risk Assessment*, uses the data presented in the *Field Ecological Assessment* to assess the risk of lead contamination at the NL Site to the following species of concern: woodcock, robin, great blue heron, red-tailed hawk, long-eared owl, red fox, and mink. Of the seven indicator species considered by the USEPA, four species, woodcock, robin, red fox, and mink were concluded to be at risk from lead at all areas assessed.

The purpose of this document is to provide technical comments on the USEPA *Field Ecological Assessment* and *Ecological Risk Assessment* reports. Four areas are covered:

- Field investigation results: soil lead levels;
- Use of field results in the assessment of ecological risk: earthworm and white-footed mouse lead levels;
- Toxicity thresholds and exposure parameters used in assessing the risk of lead contamination; and
- Computational errors in the *Ecological Risk Assessment*.

I. Field Investigation Results: Soil Lead Levels

The XRF data used to determine the soil lead concentrations in the areas selected for assessing biota lead contamination are of questionable value in a quantitative assessment of exposures. XRF soil analysis significantly overestimates the lead concentrations, which, in turn, results in an overestimation of the exposure estimates for indicator species.

The *Ecological Risk Assessment* uses XRF analysis data for surface soil lead as an input into the overall oral exposure level for indicator species. This surface soil lead data is directly incorporated into the oral dose calculation through the use of an incidental soil

ingestion rate. The use of the XRF data grossly overestimates the oral exposure via this route. Figure 1 illustrates the relationship between XRF-determined lead concentrations and lead concentrations measured by atomic absorption spectroscopy (AA) for the same soil samples. It is evident that the XRF results overestimate the lead concentration in soil by a factor as high as 8X. Figure 2 groups XRF data into discrete lead concentration ranges and shows that the ratio of XRF to AA ratio is at least 2. It therefore follows that indicator species' oral exposure levels from incidental soil ingestion should be reduced by a factor of at least 2.

II. The Use of the Field Results in the Assessment of Ecological Risk: Earthworm and White-Footed Mouse Lead Levels

A. Earthworm Lead Levels

1. There is no apparent relationship between the lead concentrations in the test chamber soils and those in earthworms.

The *Final Report: Field Ecological Assessment* describes an *in situ* earthworm bioaccumulation study. *Eisenia foetida* were used to test for bioaccumulation of lead over a 28-day period at twenty locations that were selected to represent a range of target soil concentrations of lead. A sample of worms from the stock culture served as a time zero lead concentration. However, no background (i.e., off-site local soil) worm bioaccumulation control was included in the test. After 28 days of exposure, the earthworms were removed from the test chambers, depurated of gut contents, and analyzed for lead.

Earthworms exposed to lead contaminated soil for 28 days accumulated lead to levels ranging from 29 mg/kg to 170 mg/kg. Lead concentrations of earthworms (dry weight) were not correlated with soil lead levels in the *in situ* test chambers ($r=0.18$, $n=20$). Similarly, lead concentrations in earthworms were not correlated with other soil parameters measured: TOC, grain size, pH, and percent organic matter.

A plot of earthworm lead concentrations expressed as wet weight versus soil lead concentrations (Figure 3) also supports the conclusion that there is no discernable relationship. The figure illustrates that earthworm lead concentrations do not appear to increase with soil lead concentration. Furthermore, the concentrations of lead in worms associated with the

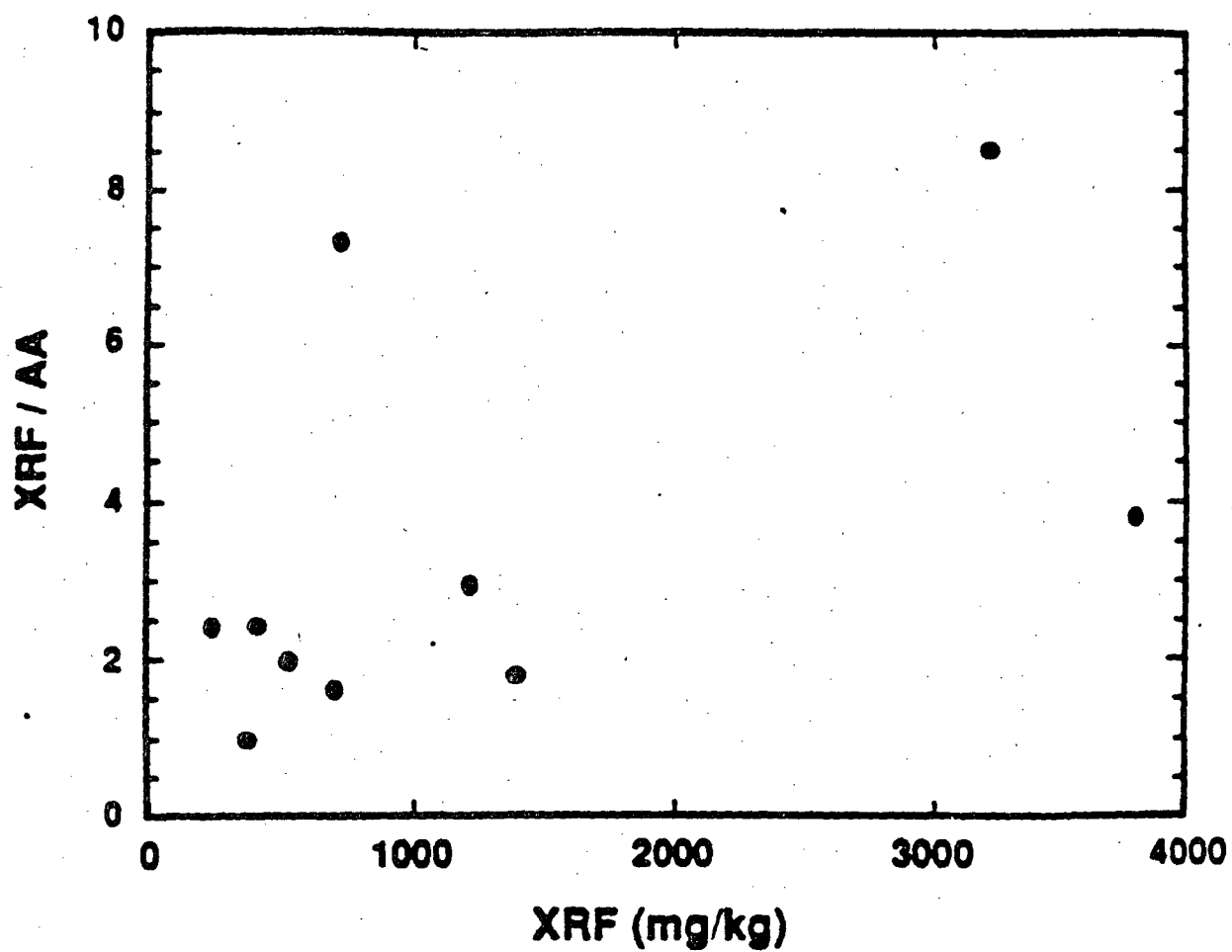


Figure 1. Relationship Between XRF and AA Measurements in Soils Less Than 4,000 ppm

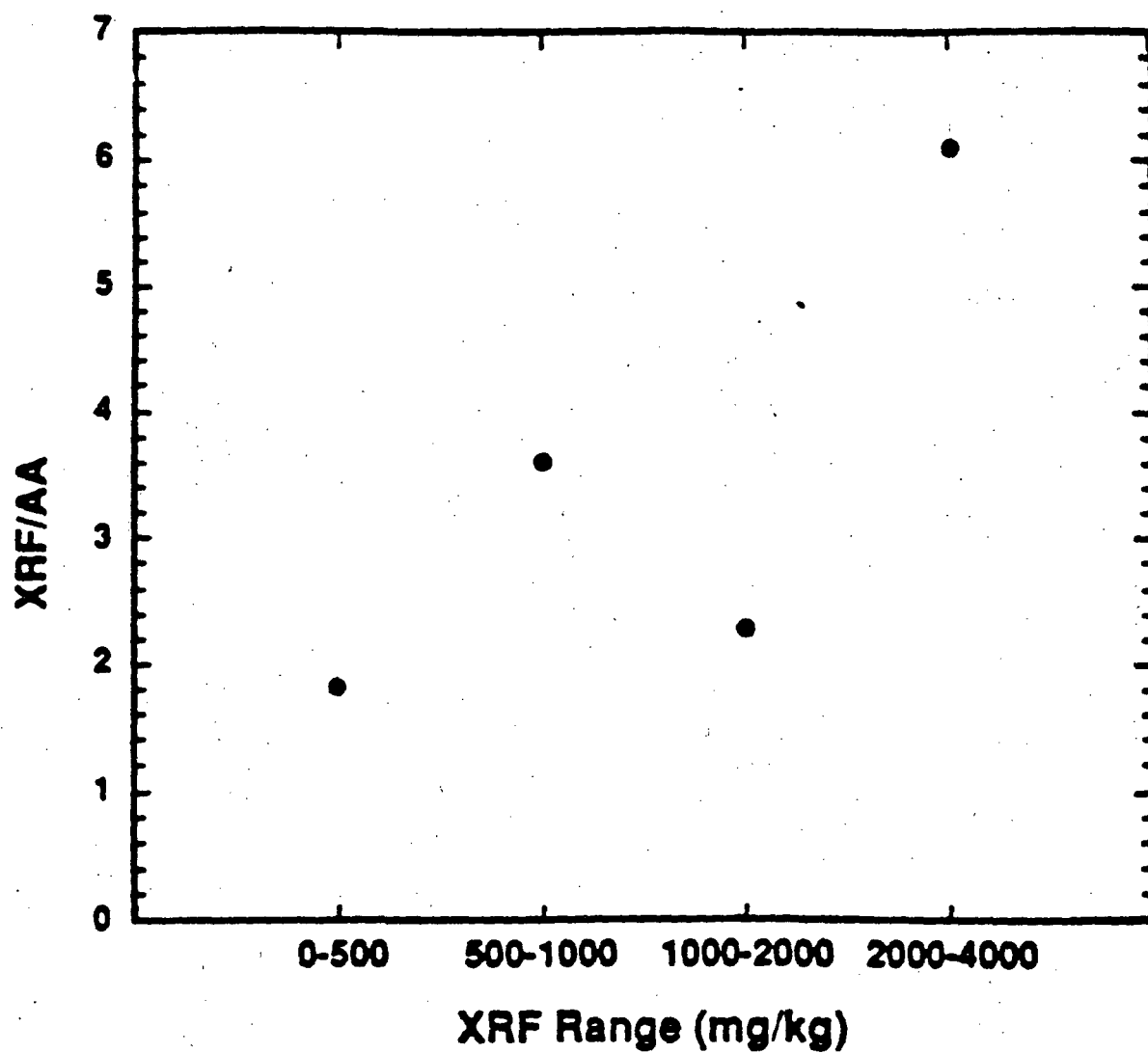


Figure 2. Ratio of XRF to AA in Soils

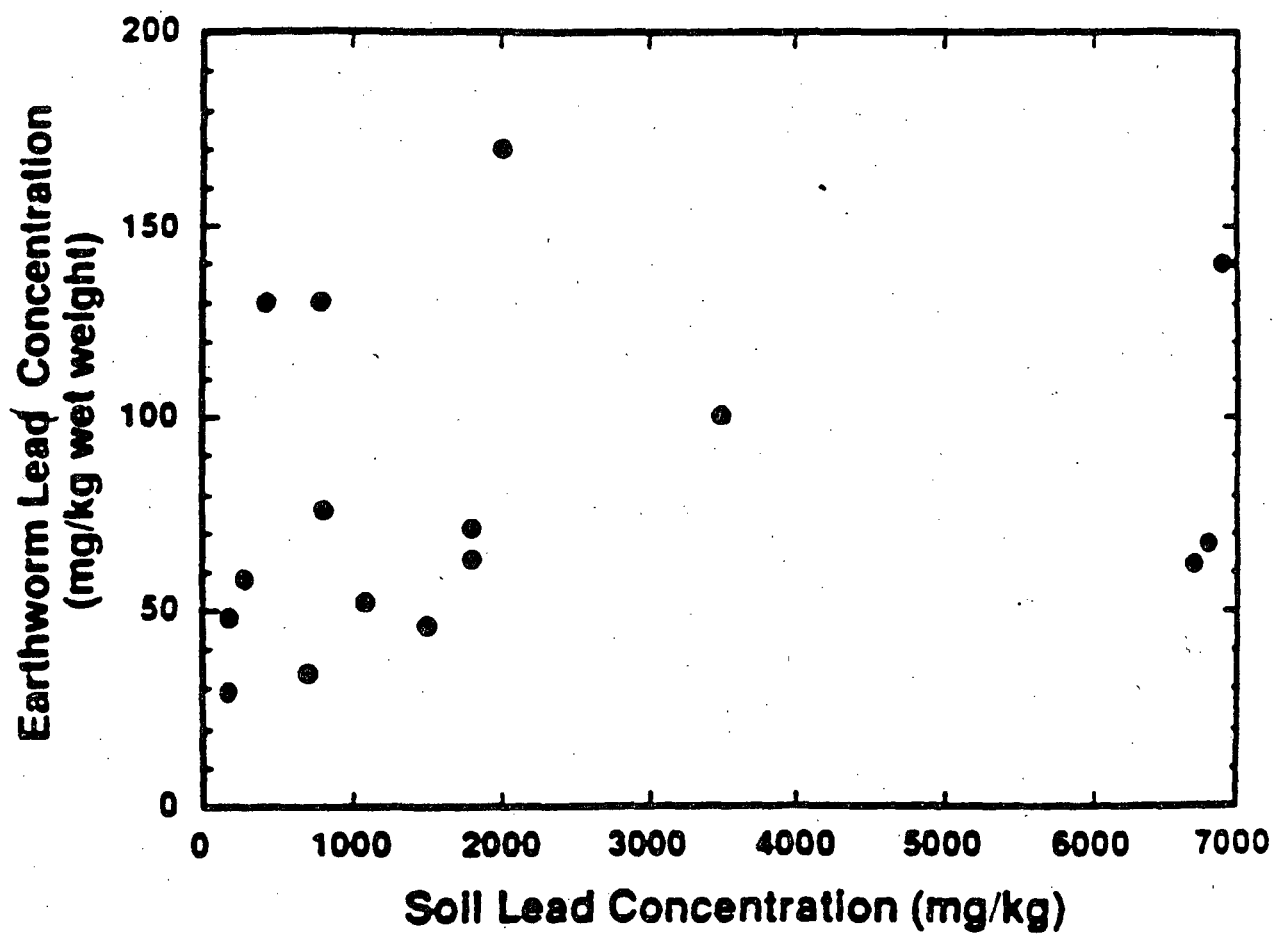


Figure 3. Earthworm Lead Concentrations Versus Soil Lead Concentrations

contaminated areas cannot be evaluated against background worm lead concentrations due to the lack of a background control in this experiment.

2. USEPA's division of the observations into groups as < 500, 500-1,000, and > 1,000 mg/kg soil is arbitrary, and the pattern of the group mean earthworm concentrations is dependent on this division.

The *Ecological Risk Assessment* arbitrarily groups the results of the earthworm accumulation study into three ranges of soil lead levels, < 500 mg/kg, 500-1,000 mg/kg, and > 1,000 mg/kg with associated mean earthworm lead levels of 66.3, 80.0, and 85.7 mg/kg (wet weight), respectively. This suggests some correlation between lead in soil and lead in earthworms, although the *Ecological Assessment* states that no statistical correlation exists between lead in earthworms and lead in soil. In addition, this grouping results in an uneven distribution of observations (only four are < 500, three between 500 and 1,000, and nine are > 1,000).

An alternative grouping of earthworm data by soil lead levels to maintain more equal group distribution would be < 1,000 (seven observations), 1,000-2,000 (four observations), and > 2,000 (five observations). Figure 4 shows that placing the earthworm observations into a different grouping of lead concentrations results suggests that no correlation exists between earthworm lead and soil lead.

B. White-Footed Mouse Lead Levels

1. There are no significant differences among the mean lead concentrations in mice (dry weight) collected from the various grid areas.

The *Final Report: Field Ecological Assessment* describes a small mammal tissue lead study. Small mammal trapping was conducted in three discrete wooded areas of the site identified during a preliminary site visit. A target sample size for each wooded area consisted of 10 white-footed mice (*Peromyscus leucopus*). The contents of the gastrointestinal tract of each animal was removed and the whole body was analyzed for lead. XRF screening for soil lead concentrations was conducted for each area sampled for small mammals.

Page 29 of the *Final Report: Field Ecological Assessment* states that there are no significant differences among the mean lead concentrations in mice from the different sampling grids, when expressed on a dry weight basis.

2. The pattern of differences in the mean wet weight lead concentration in mice is not consistent with the apparent pattern of differences in mean

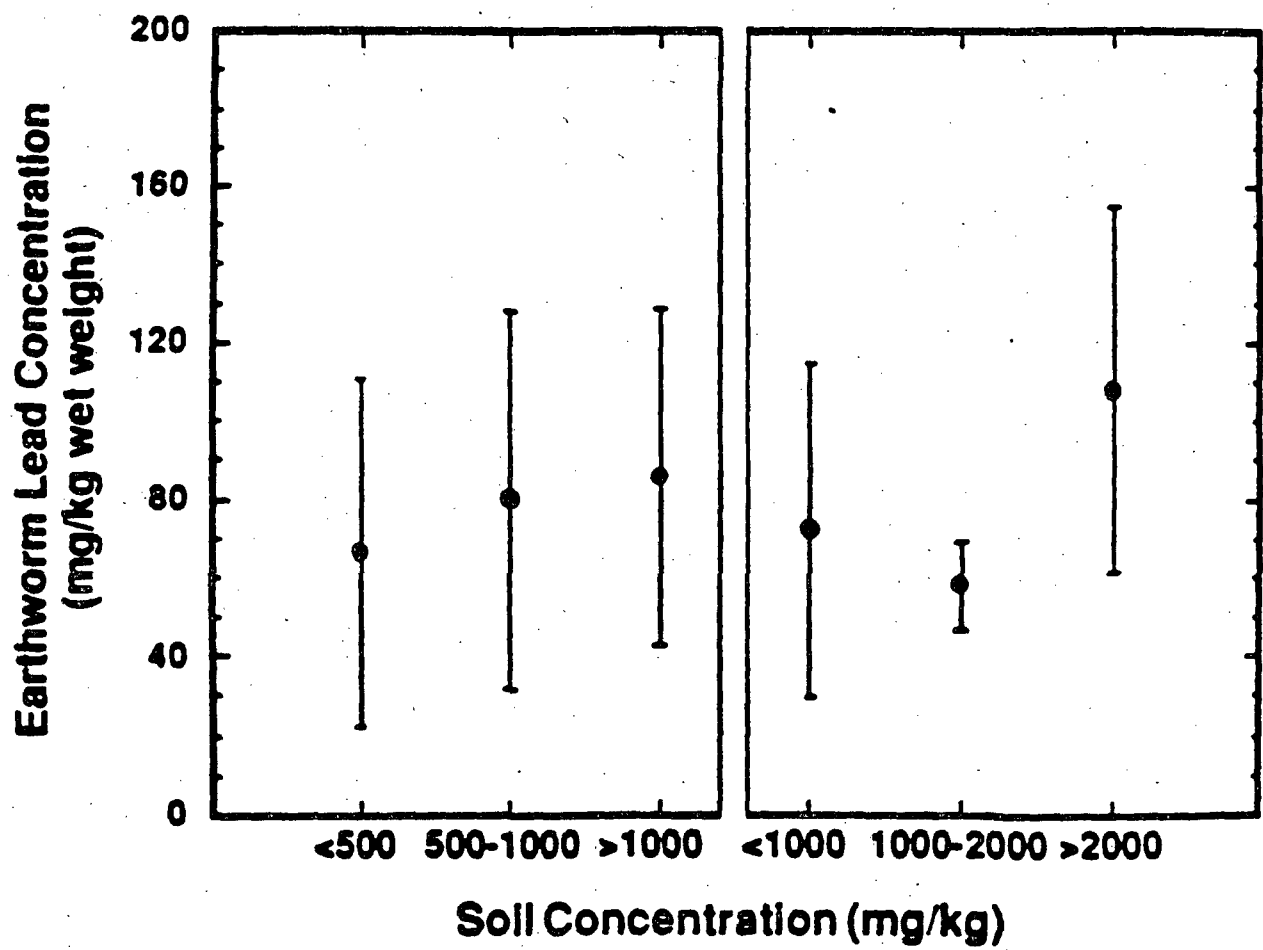


Figure 4. Influence of Selection of Soil Concentration Intervals on Calculated Mean Earthworm Concentration

soil lead concentration among the areas. Figure 5 presents a side-by-side comparison of a plot of mean lead concentration in mice (wet weight) vs. mean soil lead concentration to a plot of the means and standard deviation bars for soil lead concentration data in each sampling area. Soil lead levels are lowest in Area II and highest in Area III. The mean concentration in mice on a wet weight basis is lowest in Areas I and IA. This inconsistency suggests that the lead concentrations of the mice are not strongly related to the lead concentrations in the soil.

III. Toxicological and Biological Assumptions Used in the Ecological Risk Assessment

The area use factor is incorrectly applied in the ecological risk assessment. As described in the assessment (Page 6), "The area use factor is defined as one if the study area is greater than the home range of a species. If the study area is less than the home range, a ratio of home range size to the size of the study area will be used." The study area for the assessment is 200 acres. This application of the area use factor fails to consider the levels of lead existing within the "study area", so that the entire 200 acres is assumed to be contaminated at average lead levels between 1000 mg/kg and 2300 mg/kg depending on the exposure scenario being evaluated. This approach applies elevated lead concentrations to uncontaminated areas and areas of low concentration within the 200 acre "study area", thereby significantly overstating the ecological risk to the receptor/indicator species.

A. Woodcock Assumptions

✓ The available data suggest a toxicity threshold of 8.25 mg/kg/day and a home range of 108 acres for the woodcock.

1. The USEPA toxicity threshold is based upon a field study of lead levels in European starlings (Grue et al. 1986) which showed reductions in hematocrit, red blood cell ALAD activity, and brain weight of nestlings in a population estimated by USEPA to be exposed to dietary lead at approximately 4.1 mg/kg/day. Since these data were not included in the work plan commented on by ENVIRON (*Comments on Proposed Toxicity Thresholds and Exposure Parameters for the NL Pedricktown Site Ecological Risk Assessment*, submitted by NL Industries, Inc. on November 19, 1992) a review of the study and USEPA's interpretation was conducted.

Grue et al. (1986) is a field study of lead contamination of soil, invertebrates, and tissues of European starlings nesting in areas of high vehicular traffic. The study includes measures of blood ALAD activity, hemoglobin concentrations, hematocrits, body weights, brain weights, clutch size, hatching success, and fledgling success for the starling populations. Adult birds from areas where ingesta contained lead at 84 mg/kg dry weight

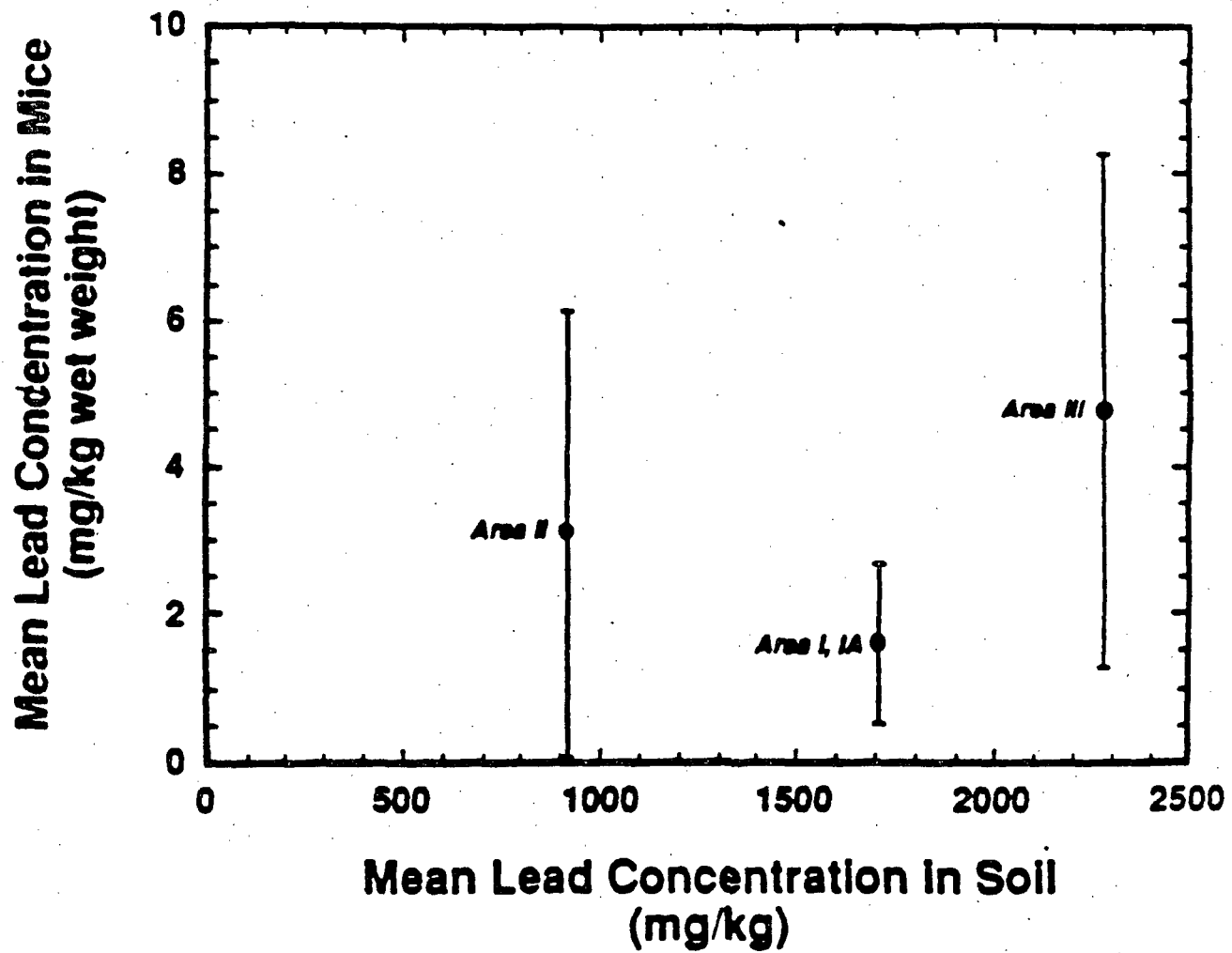


Figure 5. Plots of Mouse Lead Versus Mean Soil Lead and Mean Soil Lead by Area

exhibited ALAD activity depressions of 43 to 60 percent when compared to control populations. However, these adults showed no weight loss, paralysis, or loss of vision, nor were any reproductive effects noted. Nestlings from areas where ingesta contained lead at 94 mg/kg dry weight exhibited a 16 percent reduction in hemoglobin concentration, a 10 percent reduction in hematocrit, and significantly lower brain weights when compared to controls. It is not clear that any of these reductions would produce ecologically significant effects. Reduced brain weight in nestlings appears to be the most sensitive/serious endpoint. USEPA interprets this study as showing adverse effects in starlings at a concentration of lead in ingesta (wet weight) of 13.3 mg/kg. Because the ingesta lead concentrations in the study are reported on a dry weight basis, and no water content data for the ingesta samples are reported, it is unclear how the 13.3 mg/kg wet weight value was obtained.

Further, USEPA derives its dietary effects threshold using adult food consumption and adult body weight data even though adverse effects were reported not for adults but for nestlings. In order to accurately reflect the fact that the more ecologically significant adverse effects were observed in nestlings, a daily dietary effect threshold should be based upon food consumption and body weights for nestling starlings. Grue et al. report a starling nestling weight of 66.9 g as compared to the USEPA adult weight of 75 g. The ingestion rate for adult starlings reported by USEPA is 31 percent of body weight per day. A relationship between juvenile and adult bird consumption rates can be assumed to be such that juveniles consume twice the food per unit body weight as adults (e.g. juvenile chickens consume food at a rate of 13 percent of body weight/day, while adult chickens consume 6 percent of body weight/day [Fraser and Mayes 1986]). On the basis of this relationship, the juvenile starling food consumption rate would be 62 percent of the body weight per day, or 41.5 g/day. Allowing for the validity of the 13.3 mg/kg wet weight ingesta threshold for adverse effects in nestling starlings, the daily dietary threshold for nestling starlings would be 8.25 mg/kg/day ($13.3 \text{ mg/kg} \times 0.0415 \text{ kg/day} \times 1/0.0669 \text{ kg bw} = 8.25 \text{ mg/kg/day}$) instead of the 4.1 mg/kg/day assumed by USEPA.

2. The *Ecological Risk Assessment* lists the home range of a woodcock as being 45 acres, citing the work of Wilson (1982). This home range size does not accurately reflect the data in Wilson (1982) which lists the average home range to be 44 ha (not 45 acres) or equivalent to 108 acres.

B. Robin Assumptions

The alternative toxicity threshold value of 8.25 mg/kg/day discussed above also applies to the robin.

C. Red Fox Assumptions

The available data suggest a toxicity threshold of 2.5 mg/kg/day, and a territory size of 698 ha. for the red fox.

1. In the *Ecological Risk Assessment*, USEPA cites Demayo et al. (1982) as the source for the toxicity threshold for dogs (surrogate for the red fox) of 0.32 mg/kg/day. Demayo et al. (1982) is a secondary source that cites Hatch (1977) as the source of the 0.32 mg/kg/day. Hatch (1977) is also a secondary source that cites Zook (1973) as the source of the 0.32 mg/kg/day. Zook (1973) is also a secondary source that cites the original source of the 0.32 mg/kg/day (Finner and Calvery 1939). The Finner and Calvery study involved the feeding of lead to only 29 dogs. Of the 29 dogs used in the study, only data for five dogs are reported. Data for the other 24 animals is not available. Of the subjects reported, three received an estimated dietary dose of lead (as lead acetate) of 1.5 mg/kg/day. One of these dogs died at day 43 of exposure, a second died following 121 days of exposure (interrupted by an interim period for treatment for convulsions), and the third dog suffered paralysis by day 14 yet survived until sacrifice (time of sacrifice unreported, but over 228 days after initial exposure). The two other dogs reported were exposed to an estimated 0.33 mg/kg/day lead in the diet. These two dogs died after 140 and 167 days of exposure, with no interim signs of intoxication. No data on food consumption for the five reported subjects is available, thus the dietary dose estimates cannot be confirmed. In addition, the absence of data on the other 24 dogs in this study prevents validation of the authors' statement that the five cases reported were typical of results for all dogs. This study is not well designed nor are the results documented sufficiently to form the basis of a toxicity threshold.

The 0.32 mg/kg/day toxicity endpoint adopted by USEPA is almost an order of magnitude below the endpoints reported for the 1973 multi-dose, multi-subject, controlled dog study deemed acceptable for inclusion in the ATSDR *Toxicological Profile for Lead* (ATSDR 1990). The most sensitive endpoints listed in the ATSDR document for lead effects in dogs were a no observed adverse effect level (NOAEL) of 1.25 mg/kg/day for heme synthesis and a lowest observed adverse effect level (LOAEL) of 2.5 mg/kg/day for inhibition of ALAD activity. The citation for the ATSDR endpoints was Azar et al. (1973) which was a two-year chronic study of lead acetate administered in the diet. For comparison with the mortality/paralysis results reported in Finner and Calvery (1939), the two-year dietary study (Azar et al. 1973), showed no significant effects on appearance, behavior, weight gain, mortality, or neurology even at doses as high as 12.5 mg/kg/day over the two-year study period. The toxicity endpoints presented in ATSDR (1990) agree with a study contemporary to Finner and Calvery (1939) and also cited

in Zook (1973). This study showed no signs of toxicity in dogs dosed with lead at 1.0 mg/kg/day for six months (Horwitt and Cowgill 1939). Since a contemporary study (Horwitt and Cowgill 1939) and a multiple subject, controlled study of considerably longer duration (Azar et al. 1973) both disagree with the findings of Finner and Calvery's reported study results, the weight of evidence suggests that the 0.32 mg/kg/day endpoint is not a valid lower limit of effects for dogs. A more appropriate toxicity threshold would be the LOAEL of 2.5 mg/kg/day cited in the peer-reviewed ATSDR (1990) discussion of Azar et al. (1973).

2. In the *Ecological Risk Assessment*, USEPA uses a home range size of 57.5 ha, which is the smallest home range reported in the literature. ENVIRON recommended in the report submitted on November, 1992 to the Agency that the average red-fox home range should be 698 ha on the basis of procedures used by the Agency for an ecological risk assessment for Burnt Fly Bog, in which USEPA used the average of available home range values.

D. Mink Assumptions

There is strong reason to question the validity of the USEPA toxicity threshold for mink. In addition, an alternative value for the territory size of the species is suggested.

1. USEPA bases its toxicity threshold of 2 mg/kg/day on field study data for otters (Mason and MacDonald 1986). In the November, 1992 ENVIRON discussion of alternative toxicity values, the Mason and MacDonald study was reviewed and no clear correlation between lead intake (as measured by lead in feces) and adverse population effects could be established. USEPA maintains in its *Ecological Risk Assessment* (page 16) that the Mason and MacDonald study shows otter populations were reduced in areas where estimated lead intake exceeded 2 mg/kg/day.

A reevaluation of the Mason and MacDonald study has been performed. It must be noted that the study was not designed to establish a statistical relationship between fecal lead levels and otter population success. There was no effort made to control for any site-related parameters that may contribute to poor performance of otter populations. Decreases in populations can not be reliably attributed to the effects of any one contaminant. It must further be noted that other potentially toxic metals were found in the otter feces, further confounding any attempt to attribute causation to lead exposure. Because there are no quantitative measures presented for defining population health, no dose response relationship can be made and no quantitative ranking of population health can be made. At best, the only possible comparison could be a qualitative correlation.

In a search for such a correlation the population status ("healthy" or "declining") was compared to a ranking of the mean fecal lead levels. Three populations of otters were identified in the study as being in a state of decline, Brue, Frome, and Teme. These populations ranked 1 (Brue), 10 (Frome) and 11 (Teme), out of 13 populations studied, on the basis of mean fecal lead level. There are 8 healthy, non-declining otter populations with fecal lead concentrations higher than the mean for the Frome and Teme populations. Further, the fecal lead concentration in the declining Brue population is not statistically different from the next three highest fecal lead concentrations for healthy populations. Therefore, no correlation can be demonstrated between fecal lead and otter population performance. The study authors support such a conclusion with the statement that "at the majority of localities from where faecal samples were taken, otter populations are thriving, while at three areas where otters have declined steeply and populations may be endangered (Brue, Frome, and Teme), metal concentrations in the faeces are not exceptionally high."

Because USEPA used the fecal data to calculate dietary intake of lead for the otter populations in the Mason and MacDonald study, and it is assumed that the dietary intake-to fecal lead relationship was constant for all populations, the lack of a correlation between fecal lead and population effects makes the calculation of a dietary LOAEL for this study unrealistic. The Mason and MacDonald study should not be used to establish a toxicity threshold for mink.

2. USEPA's exposure assessment for mink at the NL Site includes the consumption (50% of the diet) of an upland small mammal, the white-footed mouse. If the consumption of upland organisms is to be considered for the mink, it appears inappropriate to limit the home range estimation to the length of an aquatic habitat. ENVIRON, in the November, 1992 report submitted to the Agency, presented a list of home range data for the mink that included area determinations in addition to the stream length data used by USEPA. ENVIRON suggests the use of an average female home range expressed in terms of acres (not linear feet). This average home range value, 476 acres based on the available data, is a more reasonable estimate of home range for the NL Site.

Additionally, no comparison has been made of the quality of the aquatic habitat available to mink in the East and West Streams versus the quality of the habitat in the Sweden surface waters on which the literature estimates of stream length territory were made. Differences in the habitat quality for mink would affect the validity of using the literature estimate. This further supports the recommendation to use an average reported territory size.

IV. Computational Errors In the Ecological Risk Assessment

The *Ecological Risk Assessment* incorrectly calculates the hazard quotient for red fox for daily intake scenario 1 for Areas I/IA and III. The hazard quotient for Area I/IA is listed as 10.06 in Table 8, where the actual ratio of daily intake to LOAEL is 6.06. The hazard quotient for Area III is listed as 14.13, where the actual ratio of daily intake to LOAEL is 8.66.

Page 10 of the *Ecological Risk Assessment* states that invertebrates comprise 43 percent of the diet of robins, with 57 percent comprised of fruits and vegetation. Table 3 in Appendix B provides an exposure calculation based upon worms being 100 percent of the diet. This inconsistency results in a hazard quotient that is roughly twice what it should be.

V. REFERENCES

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O'BRIEN & GERE

1 July 1992

Mr. Michael Gilbert
U.S. Environmental Protection Agency
Emergency and Remedial Response Division
26 Federal Plaza, Room 720
New York, New York 10278

File: 2844.014

Re: Pedricktown, New Jersey
Superfund Site

Dear Mr. Gilbert:

This letter is submitted in response to your request that NL Industries, Inc. expound upon the rationale for selecting a remedial response alternative for surface water and sediments based upon ambient water quality criteria for lead at the National Smelting of New Jersey/NL Industries, Inc. Superfund Site (the "Site") as set forth in the February 1992 Interim Feasibility Study (FS) for the Site. We are grateful that you afforded us this opportunity.

1. The Feasibility Study Recommends a Remedial Response for Stream Sediments That Will Achieve Ambient Water Quality Criteria With Minimal Adverse Environmental Impacts

To recap, the FS sets forth as remedial objectives for surface water the ambient water quality criteria for lead. We selected ambient water quality criteria as remedial response objectives because they are established benchmarks for protection of the aquatic environment, promulgated by the USEPA and also are readily measurable. The FS depicts areas where surface water quality is most adversely affected by the Site: in the West Stream south of U.S. Route 130, and in the East Stream south of the railroad tracks. Attachment 1 compares surface water quality to acute ambient water quality criteria for lead; examination of Attachment 1 shows where the acute ambient water quality criteria are exceeded. As is apparent from Attachment 1, lead concentrations in downstream segments of the West and East Streams are significantly below acute ambient water quality criteria and thus, these segments were not targeted for remediation.

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Surface Water Remedial Alternative B proposes remediation of sediments in all of the stream segments where acute ambient water quality criteria for lead are exceeded. These stream segments are illustrated on Attachment 2. Surface Water Remedial Alternative B would result in the cleanup of fifty-one hundred linear feet of stream sediments with a proposed depth of excavation of two feet, as illustrated on Attachment 3. These proposed portions of the East and West Streams are readily amenable to dewatering or re-direction. This makes it possible to excavate with precision in three dimensions, and to minimize the possibility of redistribution and resuspension of lead-bearing sediments. We believe that Surface Water Remedial Alternative B will achieve the dual goals of cleaning up the most lead-bearing stream sediments and minimizing the adverse impacts to the downstream aquatic biota.

We recognize that the current draft FS does not present a monitoring approach for assuring the achievement of acute and chronic ambient water quality criteria for lead. However, Surface Water Alternative B could easily be modified to include a surface water monitoring program. This program could include quarterly sampling of the East and West Streams and analysis for lead, hardness and any other necessary parameters. If the Agency recommends the addition of a surface water monitoring program to insure the continued protection of the fresh water aquatic environment, we are prepared to develop such a program for inclusion in the FS.

2. Dredging North of U.S. Route 130 Is Unwarranted
and Could Have Adverse Environmental Impacts

There are stream segments downstream from the areas we have proposed for remediation that, at the present time, exceed chronic ambient water quality criteria for lead. We predict that the water quality of these downstream segments will improve as remedial work at the Site progresses for several reasons. First, removal of the upstream sediments where higher levels of lead are currently found will remove some of the source of the downstream exceedances of chronic ambient water quality criteria. Moreover, as work progresses on the Operable Unit 2 surface cleanup of the Site, such as the removal of lead-bearing slag and waste piles and pooled surface water, other sources now contributing to the presence of lead downstream will be eliminated. These remedial efforts should contribute to the improvement of downstream surface water quality, with the objective of meeting AWQC acute and chronic in these stream segments and with minimal impact on downstream biota during remediation.

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We believe that the excavation of the stream segments north of U.S. Route 130 is unwarranted and would be detrimental to the aquatic environment. These stream segments are too large to be diverted or dewatered and thus, remediation would have to consist of dredging in a water column. Sediment resuspension and redistribution during the dredging is likely to result in downstream transport of entrained sediments. Further, dredging these stream sediments could be destructive to the existing ecosystem, increasing turbidity and adversely impacting the existing benthic flora and fauna.

3. The Single Sediment Cleanup Standard Suggested By USEPA, Reportedly Derived from a NOAA Document, Is Inappropriate for Use as a Cleanup Standard According to NOAA

We have previously discussed with you whether it is appropriate to establish a single numerical concentration standard to govern the cleanup of stream sediments at the Site. You have referred to a report published by the National Oceanographic and Atmospheric Agency entitled "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program", Long & Morgan, 1990 (hereinafter, the "NOAA report") as a possible source for the establishment of such a standard. The NOAA report refers to two levels of concentrations, the Effects Range Low (ERL) and Effects Range Medium (ERM) concentrations. We continue to believe that establishing a cleanup standard for stream sediments with reliance on either of these numbers is inadvisable, and without scientific basis, for several reasons.

The FS states that no toxicity-based criteria or standards are available for cleaning up lead in stream sediments. We reached this conclusion after careful evaluation of the scientific literature and, in particular, an examination of the NOAA report to which you referred. In fact, the NOAA report plainly states: "[t]hese guidelines were not intended for use in regulatory decisions or any other similar applications." NOAA report at p.1.

Because we understood this issue to be one of interest to you, we consulted directly with one of the authors of the NOAA report. Edward R. Long, co-author of the document, confirmed in a telephone conversation, that the ERLs and ERMs presented in the NOAA report were not intended to be used as standards or criteria for the cleanup of sediments. Mr. Long stated that the caveats against such use set forth in the NOAA report continue to apply.

Because we knew that you wanted to encourage further discussion on this issue, we asked Dr. James Rhea of O'Brien & Gere, who has expertise in the area of sediment chemistry, to

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comment on the extrapolation of cleanup standards from the NOAA report. Dr. Rhea concludes that such use of the ERL and ERM values presented in the NOAA report is inappropriate for several reasons:

- i. the ERM and ERL values fail to take into account the differences in bioavailability of contaminants in different sediments with widely divergent chemical and physical characteristics;
- ii. the ERM and ERL values do not identify any cause and effect relationships between chemical and biological effect (i.e., the values assume that chemicals quantified in studies are responsible for observed biological effects); and
- iii. the article relies heavily on data that lacks independent validation.

Dr. Rhea has written a critique regarding the employment of ERL and ERM values as cleanup criteria for lead at this Site, attached hereto as Attachment 4.

Some of Dr. Rhea's comments are echoed by Mr. Long in a recent publication entitled "Ranges in Chemical Concentrations in Sediments Associated with Adverse Biological Effects", Marine Pollution Bulletin, Vol. 24, No. 1, 1992. Therein, he summarizes the deviations in the NOAA ERLs and ERMs stating:

The ranges in concentrations may represent fortuitous flukes, since the variables that control bioavailability of sediment toxicants were not accounted for and differences in analytical methods, biological tests, sediment regimes, etc., occurred among the studies. . . In addition, data derived in fresh water, estuarine, and marine studies were treated equally, despite the possibility that bioavailability may differ remarkably between the two regimes.

Marine Pollution Bulletin, Vol. 24 at p. 43.

Mr. Long concluded that the evaluation of a hodgepodge of data in the NOAA report, collected from different approaches, laboratories and techniques, was analogous to comparing "grapes and watermelons". He viewed this type of comparison as "symptomatic of the current status of knowledge regarding the degree of sediment contamination that is associated with measures of biological effects" and advocated the development of techniques beyond those that are currently available.

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Page Five

4. If the Agency Still Has Reservations About Surface Water Remedial Alternative B, We Recommend the Performance of a Benthic Study and the Consideration of Factors Affecting Bioavailability

Because of the drawbacks of dredging stream segments, any decision to expand the proposed remediation of stream sediments should be based upon consideration of whether the benthic community has been adversely affected by the Site. A suitable study would compare community parameters such as species diversity, taxa dominance, species abundance, and spatial distribution in a control area unaffected by the Site to similar parameters in the potentially impacted stream sediments. Remedial decisions could then be based on statistically supported differences, if any, in the benthic community parameters. The benefit of such a study is that the adverse impacts of dredging would not be risked without prior demonstration of an adverse impact of the discharges from the Site upon the receptor ecosystem.


We also recommend the collection and analysis of data to allow the evaluation of bioavailability of lead in the stream sediments. Such data to be collected would include sediment type and properties, including organic matter content and acid volatile sulfide concentration, pH, salinity, and oxidation-reduction potential.

5. Conclusion

As you discussed with Stephen Holt, we look forward to meeting with the Agency personnel to discuss this matter further. We envision a technical discussion with input from NL's ecotoxicologist, as well as other engineers and scientists. Please call Mr. Holt at (609) 443-2405 at your earliest convenience to discuss dates for this meeting.

Very Truly Yours,

O'BRIEN & GERE ENGINEERS, INC.

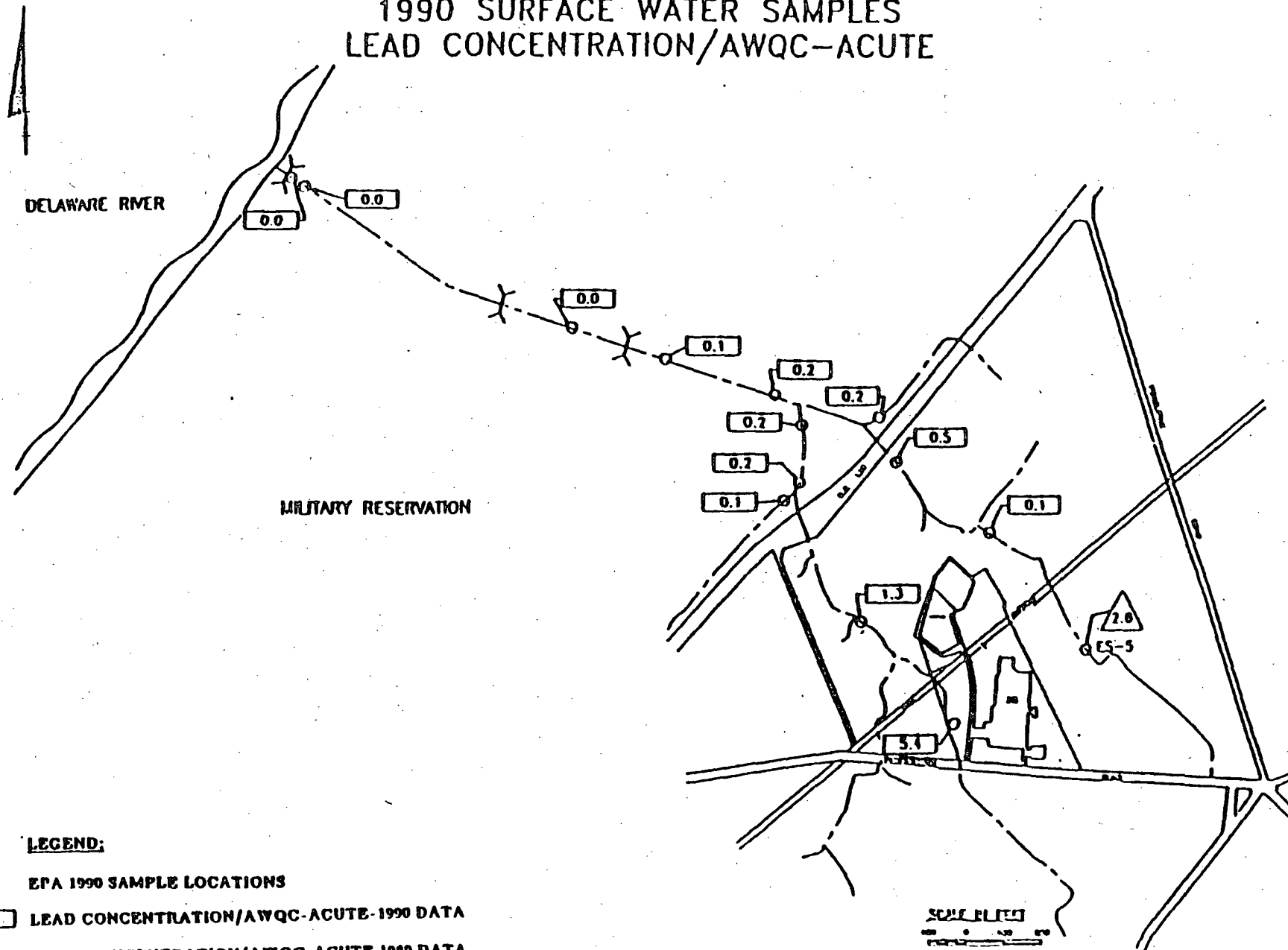

James M. O'Loughlin, P.E.
Senior Project Engineer

JMO:SWH:bg
Attachment

Mr. Michael Gilbert, USEPA, Original + 5 copies
Mr. Paul Harvey, NJDEPE, 6 copies
Mr. Stephen W. Holt, 1 copy

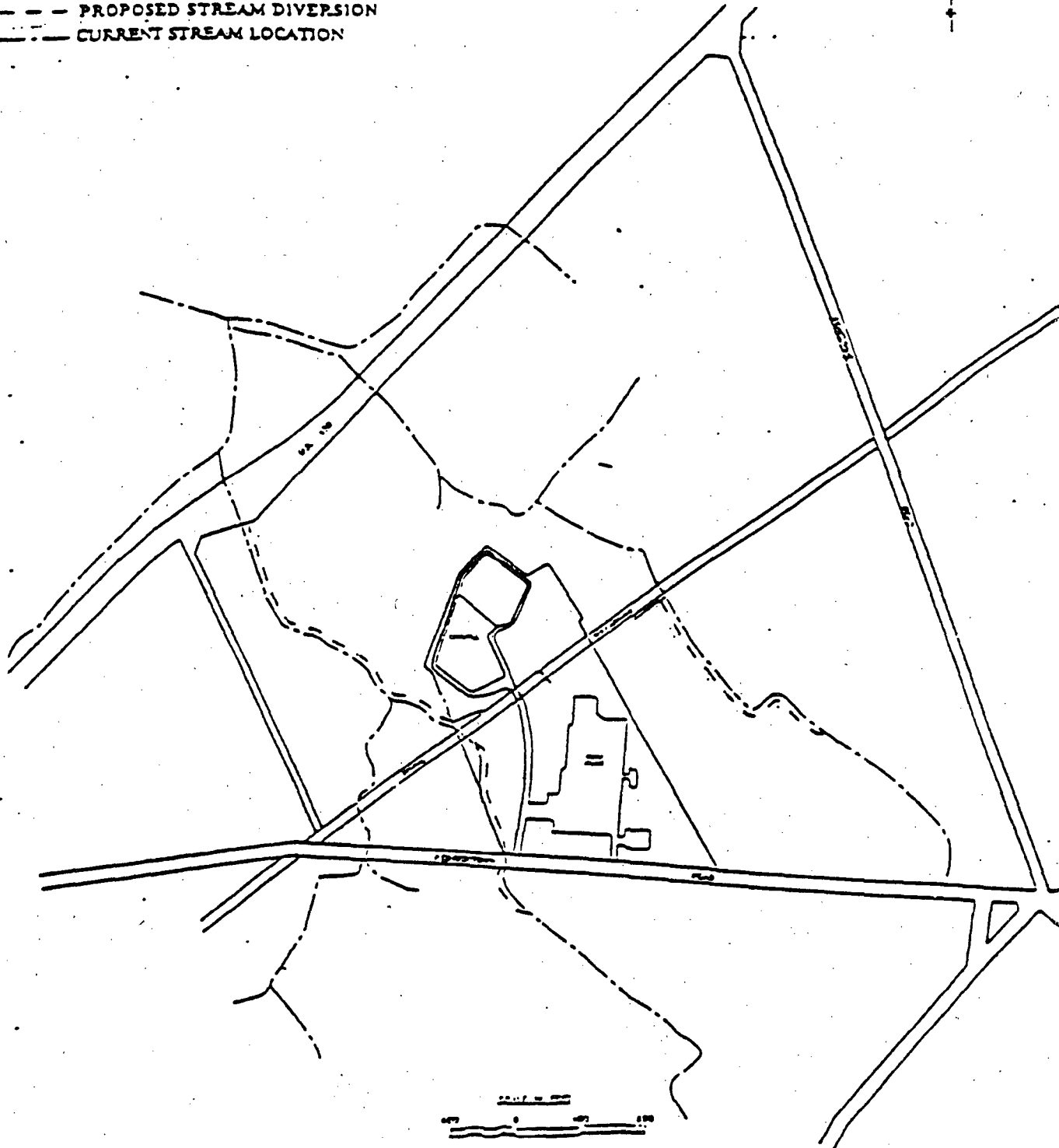
bcc: R. Machado
R. Oslan
J. Rhea
J. Schlesinger
J. Smith, Esq.
C. Pal, Esq.

NSNJ INC/NL SITE 1990 SURFACE WATER SAMPLES LEAD CONCENTRATION/AWQC-ACUTE

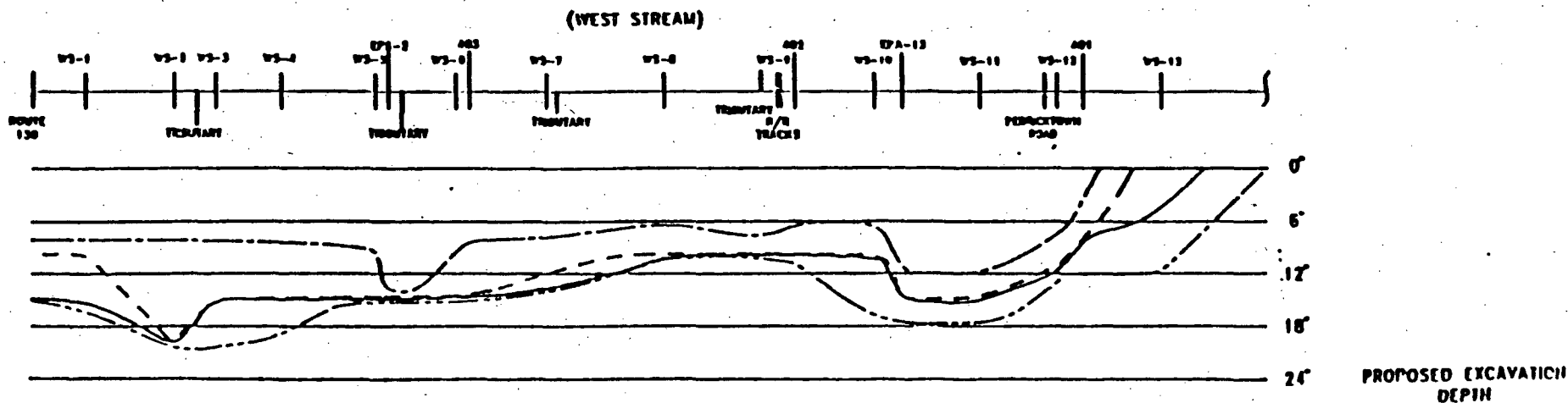
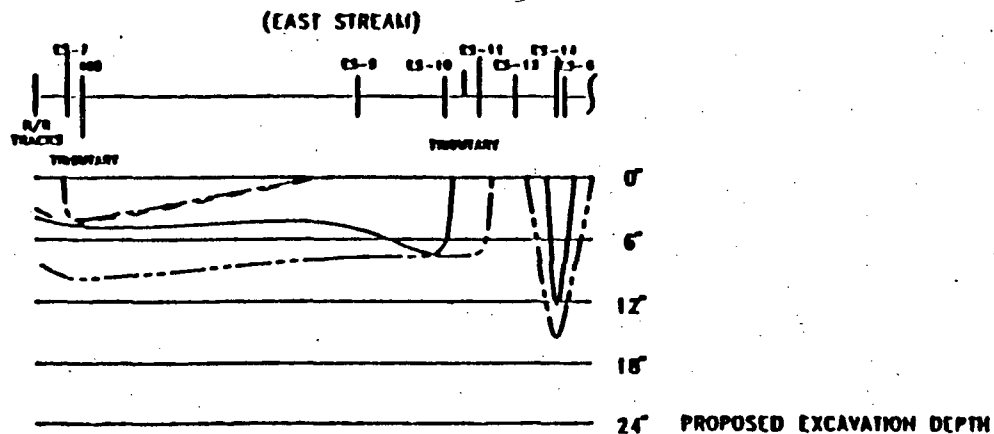


NSNJ INC/NL SITE
SEDIMENT CLEANUP PLAN

LEGEND:
--- PROPOSED STREAM DIVERSION
--- CURRENT STREAM LOCATION



NSNJ INC/NL SITE VERTICAL EXTENT OF LEAD IN STREAM SEDIMENT



SCALE: 1"=500'

FEET

SEDIMENT LEAD
CONCENTRATIONS

- 500 mg/lb
- - - 250 mg/lb
- 100 mg/lb
- 55 mg/lb



To: Jim O'Loughlin
From: Jim Rhea ^{TJB}
Subject: Pedricktown Site

Date: 1 July 1992
File: 2844.014
Copies: K. Farmer
E. Michalenko

**NL INDUSTRIES INC.
PEDRICKTOWN, NEW JERSEY**

**CRITICAL REVIEW OF THE APPLICATION OF NOAA EFFECTS RANGE VALUES TO
ESTABLISH LEAD CLEAN-UP LEVELS IN AQUATIC SEDIMENTS**

BACKGROUND

The National Oceanic and Atmospheric Administration (NOAA) annually samples and chemically analyzes marine and estuarine sediments from approximately 200 sites throughout the United States. This sampling and analysis effort is conducted as part of the National Status and Trends (NS&T) program and includes the analysis of sediments for trace metals, petroleum hydrocarbons, and synthetic organic compounds. The principal objective of the NS&T program is to characterize the chemical conditions at the sites and to establish temporal trends in pollutant levels^{1,2}. The effects of chemical concentrations on the native biological community has not been measured at the majority of the sites in the NS&T program.

In an attempt to prioritize the sites within the NS&T program for intensive regional surveys, NOAA developed guidelines for evaluating the potential for chemically induced biological effects of contaminated sediments³. The overall approach consisted of:

- assembling and reviewing the technical literature for information in which adverse biological effects of sediment contaminants were calculated, measured, or could be derived,

¹ National Oceanic and Atmospheric Administration. 1987. National Status & Trends Program for marine environmental quality. Progress report and preliminary assessment of findings of the benthic surveillance project-1984. Rockville, MD. Office of Oceanography and Marine Assessment.

² National Oceanic and Atmospheric Administration. 1988. Progress Report. A summary of selected data on chemical contamination in sediments collected during 1984, 1985, 1986, and 1987. NOAA Technical Memorandum NOS OMA 44. Rockville, MD

³ National Oceanic and Atmospheric Administration. 1990. The potential for biological effects of sediment-sorbed contaminants tested in the National Status and Trends Program. Technical Memorandum NOS OMA 52. Office of Ocean and Marine Assessment. Rockville, MD.

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- determine ranges of concentrations in which biological effects were likely to occur, and
- evaluate chemical data from the NS&T program sites with respect to established concentrations ranges estimated to produce biological effects.

The technical literature reviewed included reports which documented controlled laboratory studies of biological effects of sediments containing individual compounds, calculations of sediment quality criteria based upon equilibrium partitioning concepts, and field studies in which simultaneous measurements of chemical concentration and biological effects were measured.

Specific chemical concentrations observed or predicted to pose an adverse biological effect were sorted and an apparent effects threshold, lower 10 percentile concentration, and median concentrations were identified for a number of chemicals. The lower 10 percentile concentrations were identified as the Effects Range-Low (ER-L) values and the median concentration in the sorted list were identified as the Effects Range-Median (ER-M) values.

NOAA explicitly states that the ER-L and ER-M were not intended to be used as NOAA standards or criteria, but were simply developed as a means of assessing the NS&T data.

A number of different approaches for establishing effects based sediment quality values were employed for the analytes in the NS&T program. These different approaches included:

- background approach (BA),
- sediment/water equilibrium partitioning approach (EP),
- spiked sediment bioassay approach (SSB),
- screening level concentration approach (SLC),
- apparent effects threshold approach (AET), and
- bioeffects/contaminant co-occurrence analyses approach (COA).

The approach employed by NOAA in establishing ER-L and ER-M values assumes that data from several sediment quality criteria approaches would establish patterns between chemical concentrations and biological effects and would, therefore, be a more robust measurement of biological effects than numbers derived from a single approach.

ER-L AND ER-M FOR LEAD

An ER-L and ER-M for lead were established from 47 observed or calculated biological effects values from a number of sites. These values were established from the following approaches:

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APPROACH	NO. OF APPLICATIONS	PERCENT OF TOTAL
AET	7	14
EP	2	5
COA	38	81
TOTAL	47	100

The technical merit of the NOAA technique for establishing the ER-L and ER-M values lies in the integration of multiple approaches to establish biological effects-based sediment chemical concentration values. However, the technical literature for lead is limited to three approaches: AET, EP, and COA. Of these, the COA approach accounts for 81 percent of the database. Therefore, the ER-L and ER-M values derived for lead are biased toward values predicted from the COA approach. The COA approach includes a number of inherent assumptions regarding co-measurement of biological effects and chemical concentrations which limits its application in chemically complex environmental settings. Finally, the database for lead does not contain a single reference for an SSB derived biological effects level. An SSB value could be used to verify values obtained by other approaches.

COA APPROACH

The bioeffects/contaminant co-occurrence analysis or COA approach involves the application of field collected data for both chemical concentration and observed biological effects. The approach includes the calculation of the centrality of the chemical data (e.g. means, medians, etc.) with associated biological effects observations (high, intermediate, and low indications of effects). It is significant to note that, the data used to calculate the COA effects values ultimately employed to establish ER-L and ER-M values were collected for purposes other than determining effects thresholds.

The principal concerns with the COA approach of establishing sediment quality criteria are:

- its inability to describe cause and effect relationships,
- its lack of independent validation, and
- its inability to describe differences in bioavailability of chemicals in different sediments.

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The first concern regarding the COA approach originates from the inherent assumption that the chemicals quantified in the studies include those responsible for the observed biological effects. Chemicals not included in the analytical program for a given site may have been acting singly or synergistically with other chemicals to induce the observed effect.

The second concern is important because the COA approach assumes that the effects of the chemical compounds in question have an adverse effect in excess of that caused by the natural ecological stress inducing factors at the site. An independent validation of the COA observations such as an SSB conducted with suitable controls is desirable to filter out the effects of natural physicochemical stresses at the site.

The third concern is important because of the heterogeneity of aquatic sediment systems and the variability in factors controlling bioavailability and consequently biological effects. The bioavailability of chemicals in sediments are controlled by a number of factors including: sediment organic matter content, redox potential, pH, and in the case of trace metals, the presence of precipitant such as carbonate and sulfides. Sulfide concentrations are particularly important in controlling the bioavailability of trace metals in anoxic environments.⁴

SUMMARY

The ER-L and ER-M values were developed by NOAA solely for the purpose of assessing the NS&T data. NOAA explicitly states that these values should not be applied as sediment cleanup or quality criteria. Furthermore, the ER-L and ER-M values derived for lead are based primarily on the COA approach for establishing biological induced effects of chemicals. This approach has a number of technical limitations with regards to establishing cleanup level for sediments.

The ER-L and ER-M values derived from the NOAA database should not be used as a basis for establishing sediment cleanup goals at the Pedricktown, New Jersey site.

⁴ DiToro, D.M., and others. 1990. Toxicity of cadmium sediments: the role of Acid Volatile sulfide environmental toxicology and chemistry 9:1487-1502.

THOMPSON ASSOCIATES

U. S. Route 130, Box 156 A
Pedricktown, N.J. 08067

September 16, 1993

Mr. Stephen W. Holt
CORPORATE ENVIRONMENTAL SERVICES
NL INDUSTRIES, INC.
P.O. Box 1090
Wykoff Mill Road
Hightstown, N.J. 08520


Re: Access for NL Pipeline to Delaware River

Dear Mr. Holt:

This letter will confirm our discussion regarding your request for authorization for a pipeline easement on our property. We understand that the Pedricktown Site Group ("PSG"), a group of companies identified by the U.S.E.P.A. as potentially responsible parties for the Pedricktown Site, is seeking to acquire the necessary easements to allow PSG to construct and operate a water discharge pipeline between the former NL Industries, Inc. Site in Pedricktown, N.J. and the Delaware River. The pipeline is planned to be constructed as part of the remediation activities directed by the U.S.E.P.A. at the NL Industries Superfund Site. We understand that an easement for this pipeline requires the consent and cooperation of Thompson Associates, since our property lies between the former NL Site and the Delaware River.

We acknowledge that you have discussed the proposed pipeline easement with us and have given us preliminary information including a site sketch showing the proposed path. Based upon this preliminary information, we have no objection to entering into negotiation for the granting of such an easement.

Sincerely yours,
THOMPSON ASSOCIATES


Harry A. Skilton
Partner

HAS:hpc
cc:Mike Testa, BASILE, TESTA & TESTA
file

THE GEON COMPANY

P.O. Box 400
Rte. 130 & Porcupine Rd.
Pedricktown, New Jersey 08067
609-299-5400

Mr. Stephen W. Holt
Corporate Environmental Services
NL Industries, Inc.
P.O. Box 1090
Wykoffs Mill Road
Hightstown, New Jersey 08520

Re: Easement for Treated Effluent Pipeline To the Delaware River

Dear Mr. Holt:

This letter is to confirm the discussions you had with our Mr. Jim Kiel, Manager of Environmental Affairs, for The Geon Company Pedricktown Facility on September 9, 1993 regarding your request for an easement for a treated effluent pipeline on property owned by The Geon Company. As per the Superfund Proposed Plan for NL Industries, Inc. Operable Unit One Pedricktown, Salem County, New Jersey dated July 1993, it is anticipated that the Pedricktown Site Group (PSG), a group of companies identified by the U.S.EPA as potentially responsible parties for the NL Industries Inc. Pedricktown site, will seek to acquire the necessary easements to allow the PSG to construct and operate a treated effluent discharge pipeline from the former NL Industries, Inc. Site, Pedricktown, New Jersey to the Delaware River. This pipeline would be constructed as part of the remediation activities directed by the U.S.EPA at the NL Industries Superfund Site. The Geon Company recognize that such a pipeline would require the consent and cooperation of any property owner between the NL Site and the Delaware River plus all the appropriate environmental and construction permits.

The proposed pipeline easement path is tentatively adjacent to The Geon Company property Block #39 Lot #19 and through Block 39 Lot #16 as per the attached NSNJ INC/NL SITE drawing. Based on this preliminary information and subject to a mutually acceptable agreement between the involved parties, The Geon Company hereby expresses its intent to actively discuss with the intent to grant such an easement to PSG.

Please contact Mr. Jim Kiel to initiate formal discussions regarding the proposed pipeline easement.

Sincerely,

William Fultz

William Fultz
Pedricktown Plant Manager
The Geon Company

cc. Jim Kiel
Jim Lewis

APPENDIX B

SOW FOR OPERABLE UNIT ONE

NL INDUSTRIES INC. SUPERFUND SITE

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NL INDUSTRIES INC. SITE

STATEMENT OF WORK

A. THE WORK TO BE PERFORMED

As described in greater detail below, the Work to be performed under this Consent Decree for the NL Industries, Inc. Superfund Site (Site) shall include, but shall not be limited to, the following elements:

1. The Remedial Action (RA) which shall implement the Selected Remedial Alternative for soil, sediment and groundwater described in the July 1994 Record of Decision (OUI-ROD) (Selected Remedial Alternative) and developed in the Remedial Design (RD) conducted pursuant to Administrative Order on Consent, Index No. II-CERCLA-96-0108 (AOC);
2. The Removal Action for soil and sediment in and adjacent to the West Stream at the Site, described in the September 15, 1995 Action Memorandum (Action Memo). Elements of the RA and Removal Action are outlined below:
 - a. Remedial Construction (RC) of the Selected Remedial Alternative and Removal Action. The major components of the Selected Remedial Alternative and the Removal Action are as follows:
 - Excavation of all soils contaminated with lead above the remedial action objective of 500 parts per million (ppm), treatment via solidification/stabilization of those soils classified as hazardous under the Resource Conservation and Recovery Act, and disposal of the treated soils along with non-hazardous soils in a landfill to be constructed on the Site;
 - Removal of contaminated stream sediments above 500 ppm of lead from the East Stream and drainage channel north of Route 130 and treatment/disposal of the sediments in a manner similar to that described for soils above;
 - Excavation and disposal of soils from the West Stream and its floodplain which are contaminated above the 500 ppm cleanup level for lead;

- Extraction and treatment of contaminated groundwater with direct discharge of the treated groundwater to the Delaware River; and
- Appropriate environmental monitoring to ensure the effectiveness of the remedy.

- b. Operation and Maintenance (O&M) of the Selected Remedial Alternative;
- c. Implementation of the Wetlands Mitigation and Restoration Plan developed during the RD in order to minimize adverse impacts and offset wetland losses resulting from execution of the RA and Removal Action; and
- d. Post-Remediation monitoring of the Selected Remedial Alternative for a period of five (5) years after the U.S. Environmental Protection Agency (EPA) certifies that the Site groundwater cleanup goals, as specified in the OUI-ROD, have been achieved.

B. COMMITMENT OF SETTling DEFENDANTS

Settling Defendants shall finance and perform the Work in accordance with this Consent Decree, including all tasks set forth in this Statement of Work (SOW) and all terms, conditions and schedules set forth herein or developed and approved hereunder. The Work shall be performed in a manner consistent with the OUI-ROD, the EPA-approved RD, and the Action Memo, which set forth requirements for the Work.

C. PROJECT SUPERVISION/MANAGEMENT

1. SUPERVISORY PROFESSIONAL ENGINEER

The RC Work, O&M Work, and any other technical work performed by Settling Defendants pursuant to this Consent Decree shall meet any and all requirements of applicable federal, state and local laws and be performed under the direction and supervision of a qualified licensed professional engineer, the Supervisory Engineer. Prior to the initiation of any such work, and consistent with Section D.1, Settling Defendants shall notify EPA, in writing, of the name, title, proposed responsibilities and qualifications of the Supervisory Engineer, and the names of all contractors and subcontractors proposed to be used in

the development and implementation of the Work to be performed by those parties. All plans and specifications and all completed Work shall be prepared under the supervision of, and signed and certified by, a licensed New Jersey professional engineer. Selection of any such engineer, contractor or subcontractor shall be subject to approval by EPA. (See Sections D.1. below.)

2. PROJECT COORDINATOR

The Project Coordinator shall be responsible for the day to day management of all Work to be performed pursuant to this Consent Decree. The Project Coordinator shall have adequate technical and managerial experience to manage all Work described in this SOW and under this Consent Decree including having knowledge relating to all activities at the Site. The Project Coordinator shall not be an attorney. The Project Coordinator shall be knowledgeable at all times about all matters relating to activities regarding the RA and Removal Action. The Project Coordinator shall be the primary contact for EPA on all matters relating to Work at the Site and should be available for EPA to contact during all working days.

D. REMEDIAL ACTION AND REMOVAL ACTION

1. REQUIREMENTS

- a. Within ten (10) calendar days after lodging of this Consent Decree or thirty (30) calendar days of EPA's approval of the Final RD Report prepared pursuant to the AOC, whichever is later, Settling Defendants shall award a contract for construction of the RA and Removal Action to an appropriate contractor(s). Within thirty (30) calendar days of award of contract, the Settling Defendants shall submit a Remedial Action Work Plan (RAWP) for RC activities to EPA and the State of New Jersey (State). The RAWP shall include, at a minimum, the following items:
 - i. Any requests for modification of the approved Final RD Report based on construction methods identified by the contractor(s), or modification of the RC or Removal schedule presented in the Final RD Report;

ii. A Site Management Plan for the RC (SMP). The SMP shall be an overall plan which shall identify the Project Coordinator, Supervisory Engineer, contractors and subcontractors, and their respective responsibilities for performance of the RC. The SMP shall include a list of all individuals expected to participate in the RC. The responsibilities of each key manager, engineer, architect, scientist or technician shall be provided, as well as a curriculum vitae. A provision shall be included in the SMP providing for the submittal of supplemental information to EPA for approval prior to the involvement of additional key personnel in the RC. The SMP shall also include, at a minimum, the following items:

- (1) Identification of all off-Site facilities proposed to be used to manage hazardous substances, pollutants, contaminants, or other materials from the Site resulting from the RC Work. For each facility, the proposed materials and methods of management shall be described;
- (2) Discussion of the methods by which construction operations shall proceed. Discussion shall include the following:
 - (a) Timing of and manner in which activities shall be sequenced;
 - (b) Preparation of the Site including security, utilities, decontamination facilities, construction trailers, equipment storage and construction of roadways;
 - (c) Coordination of construction activities;
 - (d) Site maintenance during the RC Work;

- (e) Coordination with local authorities regarding contingency planning and potential traffic obstruction; and
 - (f) Entry and access to the Site during the construction period(s) and periods of inactivity, including provisions for decontamination, erosion control and dust control.
- (3) Discussion of construction quality control. This discussion shall include the following:
- (a) Methods of performing the quality control inspections, including when inspections should be made and what to look for;
 - (b) Control testing procedures for each specific test. This includes information which authenticates that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used comply with applicable standards;
 - (c) Procedures for scheduling and managing submittals, including those of subcontractors, off-Site fabricators, suppliers, and purchasing agents; and
 - (d) Reporting procedures, including frequency of reports and report formats.
- (4) An updated Health and Safety/Contingency Plan (HASCP) for the RC phase of the Work. The HASCP for the RC Work shall be developed by Settling Defendants to address the protection of public health and safety and response to contingencies that could impact public health, safety and the environment during the RC Work. The HASCP shall satisfy the requirements of the "Occupational Safety and Health Guidance for Hazardous Waste Site

Activities," (October 1985, DHH 5 NIOSH Publication No. 85-115), the Occupational Safety and Health Administration, U.S. Department of Labor (OSHA) requirements cited below and EPA Standard Operating Safety Guides, dated June 1992.

Site activities involving inspections, investigations and remedial activities shall be performed in such a manner as to ensure the safety and health of personnel so engaged. All Site activities shall be conducted in accordance with all pertinent general industry (29 C.F.R. §1910) and OSHA construction standards (29 C.F.R. §1926), as well as any other applicable State and municipal codes or ordinances. All Site activities shall comply with those requirements set forth in OSHA's final rule entitled "Hazardous Waste Operations and Emergency Response," 29 C.F.R. §1910.120, Subpart H, as set forth in the Federal Register of March 6, 1989. The HASCP shall include, at a minimum, the following items:

- (a) Plans showing the location and layout of any temporary facilities to be constructed on or near the Site;
- (b) Description of the known hazards and evaluation of the risks associated with the Site and the potential health impacts related to the Site activities;
- (c) List of key personnel and alternates responsible for Site safety, response operations and protection of the public;
- (d) Description of levels of protection (based on specified standards) to be utilized by all personnel;

- (e) Delineation of work, decontamination and safe zones, and definitions of the movement of zones;
- (f) Description of decontamination procedures for personnel and equipment, and handling and removal of disposable clothing or equipment;
- (g) Incidental emergency procedures which address emergency care for personnel injuries and exposure problems, and containment measures. These procedures shall include evacuation routes, internal and external communications procedures and procedures for response to fires and explosions. Local agencies with the capability to respond to emergencies shall be identified and their capabilities shall be described;
- (h) Description of the personnel medical surveillance program in effect;
- (i) Description of monitoring for personnel safety;
- (j) Description of routine and special personnel training programs; and
- (k) Description of an air monitoring program to determine concentrations of airborne contaminants to which workers on-Site and to which persons at the Site boundary may be exposed.

b. EPA will either approve the RAWP or require modification of it in accordance with the procedures set forth in Section XI of this Consent Decree.

- c. At least thirty (30) calendar days prior to initiation of any RC activity, the Settling Defendants shall submit the name and qualifications of the Independent Quality Assurance Team (IQAT) for approval by EPA. The IQAT is used to provide confidence to the Settling Defendants that the selected remedy is constructed to meet project requirements. The IQAT implements the RC Quality Assurance Plan by selectively testing and inspecting the work of the RC Constructor. The IQAT shall be "independent" and autonomous from the RC Constructor, and may come from within the ranks of the Settling Defendants' own staffs, the RD Professional organization, or through a separate contractual relationship with a private consulting entity. EPA's approval will be based on professional and ethical reputation, previous experience in the type of quality assurance activities to be implemented, and demonstrated capability to perform the required activities. In addition, EPA's approval will be based on the requirement for independence between the IQAT and the RC Contractor. The submitted information about the IQAT contractor shall include a written statement of qualification in sufficient detail to allow EPA to make a full evaluation of the contractors' qualifications and facilities.

2. PERFORMANCE OF REMEDIAL CONSTRUCTION WORK

- a. Upon receipt of EPA's written approval of the RAWP, Settling Defendants shall perform the RC in accordance with the RAWP and the approved Final RD Report, which includes the approved RC schedule.
- b. During performance of the RC, Settling Defendants may identify and request approval from EPA for changes to the approved RAWP, Final RD Report and construction schedule as necessary to complete the work. EPA will either approve, disapprove or require modification of any requests for changes in accordance with the procedures set forth in Section XI of this Consent Decree.

3. PHOTOGRAPHS

Settling Defendants shall furnish photographs and slides to EPA that record the progress of the RC including, at a minimum, the important features of the Site prior to the commencement of the RC Work, RC activities for the various tasks, and the appearance of the Site after the RC Work has been completed. Such photographs and slides shall be developed expeditiously and shall be submitted as part of the monthly progress report for the month in which the photographs are taken.

4. OPERATION AND MAINTENANCE PLAN

a. No later than one hundred twenty (120) calendar days prior to the scheduled completion date of the RC phase of the Work, Settling Defendants shall submit to EPA and the State an Operation and Maintenance (O&M) Plan.

b. The O&M Plan shall include, at a minimum, the following:

i. A Site Management Plan for O&M activities. (See Section D.1.a.ii., above, for SMP requirements.) The SMP for O&M activities shall identify all off-Site facilities proposed to be used to manage hazardous substances, pollutants, contaminants, or other materials from the Site resulting from the O&M work. For each facility, the proposed materials and methods of management shall be described;

ii. A Sampling, Analysis and Monitoring Plan (SAMP) for O&M activities. These activities shall include, but are not limited to the collection of groundwater and groundwater treatment system influent and effluent samples, sediment samples, and any samples necessary for maintenance of the landfill. In order to assure appropriate sampling and analysis is performed, Settling Defendants should assure the following:

(1) All sampling and monitoring shall be performed in accordance with the "Region

II CERCLA Quality Assurance Manual," EPA Region II, Revision 1, dated October 1989, or latest version. All testing methods and procedures must be fully documented and referenced to established methods or standards.

- (2) The SAMP for O&M activities shall include, at a minimum, the following items:
 - (a) An explanation of the sampling, analysis, testing, and monitoring procedures that will produce data for the O&M phase;
 - (b) A detailed description of the sampling, analysis, and testing to be performed, including sampling methods, analytical and testing methods, sampling locations and frequency of sampling;
 - (c) A map depicting sampling locations; and
 - (d) A schedule for performance of specific tasks.
- (3) Additional sampling locations, testing, and analysis subsequently identified shall be submitted as an addendum to the SAMP.

iii. A Quality Assurance Project Plan for O&M activities. The QAPP shall be completed in accordance with the "Region II CERCLA Quality Assurance Manual," EPA-Region II, dated October 1989, or latest version, and all other guidance as specified in Section VIII. of this Consent Decree. In order to provide quality assurance and maintain quality control with respect to all samples collected during the O&M Work, Settling Defendants shall ensure the following:

- (1) The QAPP shall include, at a minimum, the following items:
 - (a) Title Page
 - (b) Table of Contents
 - (c) Project Description
 - (d) Project Organization and Responsibility
 - (e) Quality Assurance Objectives
 - (f) Sampling Procedures
 - (g) Sample Custody and Document Control
 - (h) Calibration Procedures and Frequency
 - (i) Analytical Procedures
 - (j) Data Reduction, Validation and Reporting
 - (k) Internal Quality Control Checks and Frequency
 - (l) Performance and Systems Audits
 - (m) Preventive Maintenance
 - (n) Specific Routine Procedures Used to Assess Data Precision, Accuracy and Completeness
 - (o) Corrective Action
 - (p) Quality Assurance Reports to Management;
- (2) Settling Defendants shall use quality assurance procedures and chain-of-custody procedures in accordance with standard EPA protocol;
- (3) Settling Defendants shall ensure, prior to engagement of a laboratory for the analyses of samples, that the laboratory is either a participant in good standing in EPA's Contract Laboratory Program (CLP), or that the laboratory can demonstrate its ability to perform all tasks required under the CLP;
- (4) In the event that the laboratory utilized by Settling Defendants is not CLP-certified for a relevant set of parameters, Settling Defendants shall ensure that the laboratory will analyze performance evaluation samples submitted by EPA for those parameters for quality assurance purposes;

- (5) Settling Defendants shall ensure that the laboratory utilized for analyses of samples performs all analyses according to accepted EPA methods as documented in the "Contract Lab Program Statement of Work for Organic Analysis (3/90)," or latest revision, and the "Contract Lab Program Statement of Work for Inorganic Analysis (3/90)," or latest revision, or other EPA approved methods;
- (6) Upon receipt from the laboratory, Settling Defendants shall promptly validate all analytical data and shall promptly submit to EPA the validation package (checklist, report and Form #1 containing the final data), prepared in accordance with the provisions of Section D.4.b.iii(7), below;
- (7) Settling Defendants shall ensure that all analytical data are validated according to the procedures stated in the "EPA Region II Contract Lab Program Organics Data Review and Preliminary Review (SOP #HW-6, Revision 11)," dated June 1996 or the latest revision, and the "Evaluation of Metals Data for the Contract Laboratory Program (SOP #HW-2, Revision 11)," dated January 1992 or the latest revision, or EPA approved equivalent procedures;
- (8) Upon request by EPA, Settling Defendants shall promptly provide EPA with any prevalidated results of all sampling and/or tests or other data generated by Settling Defendants with respect to the implementation of this Consent Decree. These prevalidated results should be stamped to indicate that they are draft or preliminary;
- (9) All analytical data shall be submitted in a CLP deliverables format, or in a similar approved format, to EPA and to the State;

(10) Settling Defendants shall ensure that all contracts with the laboratory utilized by Settling Defendants for analyses of samples provide for access of United States Government personnel and authorized representatives of the United States for the purpose of ensuring the accuracy of laboratory results related to the Site; and

(11) Settling Defendants shall require full CLP deliverables from the laboratory for the analytical data from groundwater monitoring during the two year period of drinking water standard attainment. (See Section E.2., below.) Upon EPA's request, Settling Defendants shall submit to EPA the full CLP documentation for this sampling.

iv. A HASCP for O&M activities. (See Section D.1.a.ii.(4) for HASCP requirements.)

v. A description of the routine O&M for the groundwater extraction, treatment and discharge system including a description of tasks for operation, tasks for maintenance, and prescribed treatment or operating conditions. In addition, maintenance of the landfill should be discussed;

vi. A description of potential operating problems and remedies to such problems;

vii. A description of alternative O&M in the event of system failure;

viii. A schedule for equipment replacement;

ix. A detailed description of the appropriate sampling, storage, treatment or disposal of hazardous wastes generated from the on-Site groundwater treatment system; and

x. An O&M schedule that identifies the frequency of O&M activities and the timing of O&M activities.

c. EPA will either approve the O&M Plan, or require

modification of it, in accordance with the procedures set forth in Section XI of this Consent Decree.

- d. Modifications to the approved O&M Plan may be submitted to EPA for consideration upon completion of the RC or thereafter if Settling Defendants demonstrate that such modifications would enhance and/or maintain the cleanup of groundwater, soils and sediment or the monitoring of such cleanup.
- e. EPA will either approve, disapprove, or require modifications of any requests for modification of the O&M Plan, in accordance with the procedures set forth in Section XI of this Consent Decree.

5. NOTICE OF COMPLETION AND FINAL REPORT FOR THE REMEDIAL CONSTRUCTION

- a. Within fourteen (14) days after the Settling Defendants assert that the RC is substantially complete, the Settling Defendants and their contractor(s) shall be available to accompany EPA personnel and their representatives on a pre-final inspection of the Work. The pre-final inspection shall consist of a walk-over of the Site to determine the completeness of the RC, and its consistency with the RD Report, the Consent Decree, the requirements of the OUI-ROD, the requirements of the Action Memo, and applicable Federal and State laws, rules and regulations.
- b. Following the pre-final inspection, EPA will either specify the corrective measures necessary, or will determine that the RC is complete. If EPA requires corrective measures, the Settling Defendants shall undertake the corrective measures in accordance with a schedule approved by EPA. Within fourteen (14) days after completion of the corrective measures, the Settling Defendants and their contractor(s) shall be available to accompany EPA personnel and their representatives on an inspection of the Site as described in the above paragraph. Following this inspection, EPA will provide further directions and/or notifications as provided above.

- c. Within sixty (60) calendar days after EPA determines that RC has been completed, the Settling Defendants shall submit to EPA a Final Report for the Remedial Construction (RC Final Report). The RC Final Report shall include the following sections:
- i. A Notice of Completion section shall be provided indicating that the RC has been completed in compliance with the requirements of the EPA-approved RD Report, the OUI-ROD, the Action Memo and the Consent Decree. The Notice of Completion shall be signed by a qualified licensed professional engineer meeting any and all requirements of applicable Federal and State laws, and shall certify that the RC work has been completed in full satisfaction of the requirements of the Consent Decree, this SOW, and all plans, specifications, schedules, reports, and other items developed hereunder.
 - ii. A Construction Quality Control section shall be included which provides a summary of the implementation of the Construction Quality Control Plan as well as assurance that the RC was completed in compliance with the Final RD Report, the Consent Decree, the OUI-ROD and the Action Memo.
 - iii. A Construction Activities section shall be included in the RC Final Report. This section should include a narrative description of the construction activities undertaken for the RA and Removal Action (e.g., quantities excavated, cleanup levels achieved, materials and/or equipment used, etc.) The name and role of the major design and remedial construction contractors should be provided. A verification that all equipment used during the RC has been decontaminated, dismantled and removed from the Site should also be provided. If the Selected Remedial Alternative and Removal Action, as implemented, differs in any way from the approved plans and specifications of the Final Remedial Design Report, such modifications shall be reported, and "as built" plans and specifications shall be provided showing all such modifications. The

reasons for all such modifications shall be described in detail. The "as-built" drawings shall be signed and stamped by a professional engineer.

iv. A section which documents the pre-final and final inspections conducted by the Settling Defendants and EPA shall be included in the RC Final Report. This section should include a brief description of the deficient construction items (punchlist) reported and resolved during the pre-final and final inspections and a list of attendees at the inspection(s). The final resolution of all deficient items should be documented.

v. The RC Final Report shall include a certification statement, signed by a responsible corporate official of one or more of the Settling Defendants or by the Settling Defendants' Project Coordinator, which states the following:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

vi. A section should be included in the RC Final Report which discusses the highlights of the O&M Plan, and provides insight into potential problems/concerns.

d. EPA will either approve the Remedial Construction Report, require modification, and/or require corrective measures to fully and properly implement the RC.

E. OPERATION AND MAINTENANCE

Upon EPA's determination that the RC is complete, Settling Defendants shall perform O&M activities in accordance with the approved O&M Plan, which includes the O&M schedule.

1. POST-REMEDATION GROUNDWATER MONITORING PLAN

- a. Within thirty (30) calendar days of the date on which all designated monitoring points first achieve cleanup standards subject to the provisions of Goals for Aquifer Restoration of Section E.2.a. herein, or within thirty (30) days of the date that EPA determines, in its sole discretion, that a ARARs waiver is granted, Settling Defendants shall submit to EPA and the State a Post-Remediation Groundwater Monitoring Plan.
- b. The Plan shall include, at a minimum, the following:
 - i. A Site Management Plan for post-remediation activities. (See Section D.1.a.ii., above, for SMP requirements.)
 - ii. A Sampling, Analysis and Monitoring Plan (SAMP) for post-remediation activities. (See Section D.4.b.ii., above, for SAMP requirements.) At a minimum, the SAMP should provide for initial groundwater sampling on a quarterly basis.
 - iii. A Quality Assurance Project Plan for post-remediation activities. (See Section D.4.b.iii., above, for QAPP requirements.) Settling Defendants shall require full CLP deliverables from the laboratory for analytical data from groundwater monitoring throughout the five-year Post-Remediation Groundwater Monitoring period. Upon EPA's request, Settling Defendants shall submit to EPA the full CLP documentation for this sampling.
 - iv. A Health and Safety/Contingency Plan for post-remediation monitoring. (See Section 1.a.ii.(4), above, for HASCP requirements.)
 - v. A post-remediation monitoring schedule that identifies the type and frequency of monitoring, and when these activities will commence.

- c. EPA will either approve the Post-Remediation Monitoring Plan or will require modification of it, in accordance with the procedures set forth in Section XI of this Consent Decree.

2. GOALS FOR AQUIFER RESTORATION

- a. The Performance Standards for aquifer restoration at the Site, as set forth in the OUI-ROD, are the drinking water standards.
 - i. Settling Defendants shall operate the groundwater remediation system until the Performance Standards are attained in all designated monitoring points for two (2) consecutive years, or shorter period, if approved by EPA in its sole discretion, or;
 - ii. Following the operation of the groundwater remediation system for a period of two (2) consecutive years, or a shorter period if approved by EPA in its sole discretion, the Settling Defendants shall perform O&M of groundwater remediation system contingency measures (See Section E.2.b. for a description of contingency measures) until the Performance Standards are attained in all designated monitoring points for a period of two (2) consecutive years, or a shorter period if approved by EPA in its sole discretion, or;
 - iii. Following the implementation of the contingency measures for a period of two (2) consecutive years, or a shorter period if approved by EPA in its sole discretion, the Settling Defendants may petition EPA for a technical impracticability (TI) waiver of one or more of the Performance Standards, consistent with EPA guidance, including, but not limited to, "Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration (EPA/540-R-93-080)," and shall implement the Alternative Remedial Action, selected by EPA in its sole discretion, in conjunction with the issuance of the TI waiver.

- b. Settling Defendants may submit a contingency measure petition to EPA in writing requesting authorization to amend the O&M Plan through the implementation of contingency measures if, based on a thorough analysis of the operation of the groundwater remediation system, the Settling Defendants believe the Performance Standards will not be achieved through continued implementation of the O&M Plan. Settling Defendants shall identify the need, based upon the above-mentioned analysis, for implementation of such measures, and shall propose to EPA in such petition what measures they will implement to achieve the Performance Standards. The contingency measure petition, unless otherwise directed by EPA, shall address design, construction, and O&M of the contingency measures, and shall include a schedule for implementation of those measures.
- i. During this review period, Settling Defendants shall continue to implement the O&M Plan until otherwise directed by EPA.
- ii. EPA will either approve the contingency measure petition or require modification of it, in accordance with the procedures set forth in Section XI of this Consent Decree.
- iii. Settling Defendants shall implement the provisions of the contingency measure petition within thirty (30) days of receipt of EPA's written approval of the contingency measure petition.
- c. Settling Defendants may petition EPA to waive compliance with one or more of the Performance Standards based on a demonstration that it is technically impracticable, from an engineering perspective, to attain those standards. Settling Defendants shall not submit such a petition until they have implemented the contingency measures for at least two (2) years, or a shorter period if approved by EPA in its sole discretion. The Settling Defendants' petition shall include a request for the waiver of the pertinent Performance Standards. If the first petition is rejected, submittal of subsequent petitions must be based on significant new information which could not have been developed at the time the

previous petition was submitted. The contents of the petition shall include, at a minimum, the information and analysis described below:

- i. A list of the Performance Standards for which waivers are being sought;
- ii. A description of the conceptual model for Site contamination, including geological, hydrogeologic, and geochemical characterizations. The sources, distribution, characteristics, migration potential, and quantities of contaminants present at the Site at the time of the petition shall be described. These descriptions shall incorporate pertinent data obtained during design, construction, and operation of the groundwater remediation system, as well as other pertinent information obtained during any previous Site characterization efforts;
- iii. Comprehensive groundwater monitoring data and an evaluation of the groundwater remedy implemented, along with any other remediation actions performed which enhanced or affected this remedy. The petition should also demonstrate that the remedy has been designed, constructed, and operated in a manner which is consistent with the hydrogeologic and contaminant conceptual models of the Site, and that the groundwater remediation system has been modified or enhanced to the extent practicable by the implementation of contingency measures in order to improve its ability to achieve the Performance Standards;
- iv. A description of known or suspected groundwater contaminant sources at the Site. The petition should also describe source control and removal efforts undertaken, and the effectiveness of those efforts;
- v. An analysis of the performance of the groundwater remedy which describes the spatial and temporal trends in groundwater contaminant concentrations within the groundwater plume. The petition shall discuss the

hydrogeochemical factors which influence the remedy's ability to achieve the Performance Standards, and demonstrate how these factors inhibit the remedial system from achieving the Performance Standards;

- vi. The mass of contamination removed from the Site using the groundwater remediation system, and an estimate of the mass of contamination remaining;
- vii. A demonstration (including appropriate engineering analysis) that all other technologies which are potentially applicable to the Site cannot achieve the Performance Standards in a manner that is practicable from an engineering perspective. This demonstration shall include a prediction of the level of cleanup other technologies can achieve;
- viii. A predictive analysis of the approximate timeframe required to achieve the Performance Standards with the existing groundwater remediation system (and any alternative remedial strategies, if applicable) using methods appropriate for the data and the Site-specific conditions. Such analysis shall also address the uncertainty inherent in these predictions;
- ix. A description and comparison of Alternate Remedial Strategies proposed to be implemented by the Settling Defendants if a TI waiver is granted. Alternate Remedial Strategies must achieve a level of cleanup and control that ensures protection of human health and the environment and prevents further migration of contaminated groundwater. Alternate Remedial Strategies may include the establishment of Alternate Performance Standards, and other Alternate Remediation Requirements to ensure protectiveness. Proposed modifications to the existing remedy and any additional response actions proposed to be undertaken shall be described by the Settling Defendants in detail. EPA will make the final determination regarding the components of the Alternate

Remedial Strategy which shall be implemented at the Site by the Settling Defendants;

- x. A description of additional groundwater monitoring required to verify compliance with the Alternate Performance Standards or Alternate Remediation Requirements. EPA will make the final determination regarding the scope of the groundwater monitoring requirements under the Alternate Remedial Strategy; and
- xi. Other information or analyses not included above but which the Settling Defendants or EPA consider appropriate to making a determination on the petition.
- d. During EPA's review of the petition submitted in accordance with Paragraph E.2.c, the Settling Defendants shall continue to implement the O&M Plan until otherwise directed by EPA.
- e. Upon review of all information required by Paragraph E.2.c., EPA will determine (1) whether compliance with any of the Performance Standards shall be waived; (2) what, if any, Alternate Performance Standards or Alternate Remediation Requirements will be established by EPA; and (3) whether modification to any portion of the RA or any additional response actions are required. If EPA denies the petition, the Settling Defendants shall continue to perform O&M unless otherwise directed by EPA.
- f. No action taken by EPA pursuant to this Section of the SOW, including EPA's decision on Settling Defendants' petition(s), shall be subject to dispute resolution or judicial review.

3. NOTICE OF COMPLETION AND O&M REPORT

- a. Within sixty (60) days of meeting the Performance Standards as specified in the OUI-ROD and this SOW (or a shorter period if approved by EPA in its sole discretion), or if Alternate Performance Standards or Alternate Remediation Requirements are established by EPA, within sixty (60) days of

completion of any additional response actions required by EPA, the Settling Defendants shall submit to EPA a Notice of Completion and Final O&M Report for the RA and Removal Action. This report should include documentation that each Performance Standard has been met in accordance with the Consent Decree.

- b. If, after review of the written report, EPA determines that the O&M has not been completed, and/or additional tasks are required, EPA will notify the Settling Defendants in writing of the activities that must be undertaken to complete O&M. EPA will set forth in the notice a schedule for performance of the additional activities or will require the Settling Defendants to submit a schedule to EPA for approval. Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules.
- c. Settling Defendants shall then modify the O&M Report and incorporate summaries of the Settling Defendants' actions to address EPA's comments and the specified additional activities and tasks in a revised O&M Report, which shall be certified and signed by a licensed professional engineer. The revised O&M Report shall be submitted to EPA within thirty (30) calendar days after completion of the EPA-specified activities and tasks.

F. POST-REMEDATION GROUNDWATER MONITORING

1. REQUIREMENTS

- a. Upon EPA's certification of completion of the O&M work, Settling Defendants shall commence a Post-Remediation Groundwater Monitoring Program for a period of five (5) years, in accordance with the approved Post-Remediation Groundwater Monitoring Plan, which includes the post-remediation groundwater monitoring schedule.
- b. If increasing concentrations above Performance Standards specified in the OUI-ROD are detected, EPA will evaluate the need, and may require the Settling Defendants to, reinstate the remediation system.

2. NOTICE OF COMPLETION AND FINAL REPORT FOR POST-REMEDATION GROUNDWATER MONITORING

- a. Within thirty (30) calendar days of the completion of Post-Remediation Monitoring, Settling Defendants shall submit to EPA and the State a Notice of Completion and Final Report for the Post-Remediation Monitoring program. (See Section D.5., above, for requirements.)
- b. EPA will determine whether the Post-Remediation Monitoring activities or any portion(s) thereof have been completed in accordance with the standards, specifications and reports required by this Consent Decree. If not, EPA shall notify Settling Defendants in writing of those tasks which must be performed to complete the Post-Remediation Monitoring. Settling Defendants shall then implement the specified activities and tasks in accordance with the specifications and schedules established by EPA and shall then submit a further report on the specified activities and tasks and certification signed by a licensed professional engineer, within twenty (20) days after completion of the specified activities and tasks.

G. NOTICE OF COMPLETION OF RA AND REMOVAL ACTION

- a. Within ninety (90) days after Settling Defendants conclude that the RA and Removal Action (including O&M and Post-Remediation Monitoring) have been fully performed, the Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by the Settling Defendants and EPA. If, after the pre-certification inspection, the Settling Defendants still believe that the RA and Removal Action have been fully performed, they shall submit a written report requesting certification to EPA for approval, with a copy to the State, within thirty (30) days of the inspection. This report shall describe all activities undertaken by the Settling Defendants in order to achieve the requirements of this Consent Decree.

- b. If, after review of the written report, EPA determines that the RA and Removal Action have not been completed in accordance with the standards, specifications, and reports required by this Consent Decree, EPA will notify the Settling Defendants in writing of the activities that must be undertaken to complete the RA and Removal Action or achieve the Performance Standards. EPA will set forth in the notice a schedule for performance of the additional activities or will require the Settling Defendants to submit a schedule to EPA for approval. Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules.
- c. If EPA concludes, based upon the initial or any subsequent report requesting Certification of Completion of the RA and Removal Action that the RA and Removal Action have been fully performed in accordance with the Consent Decree and that the Performance Standards have been achieved, EPA will so certify in writing to the Settling Defendants.

H. DECOMMISSIONING

- a. After Settling Defendants complete the OUI O&M and Post-Remediation Monitoring Work, and upon the direction of EPA, the Settling Defendants shall remove and decommission the groundwater remediation system. In addition, the Settling Defendants shall restore properties affected by the OUI RA and Removal Action in accordance with the approved Wetlands Mitigation and Restoration Plan.
- b. At the conclusion of decommissioning activities, the Settling Defendants shall prepare and submit to EPA and the State a Decommissioning Report documenting all activities undertaken to decommission the Site.
- c. EPA will either approve the Decommissioning Report, or will require modification of such report, in accordance with the procedures set forth in Section XI of this Consent Decree.

APPENDIX C

MAP OF NL INDUSTRIES, INC. SITE

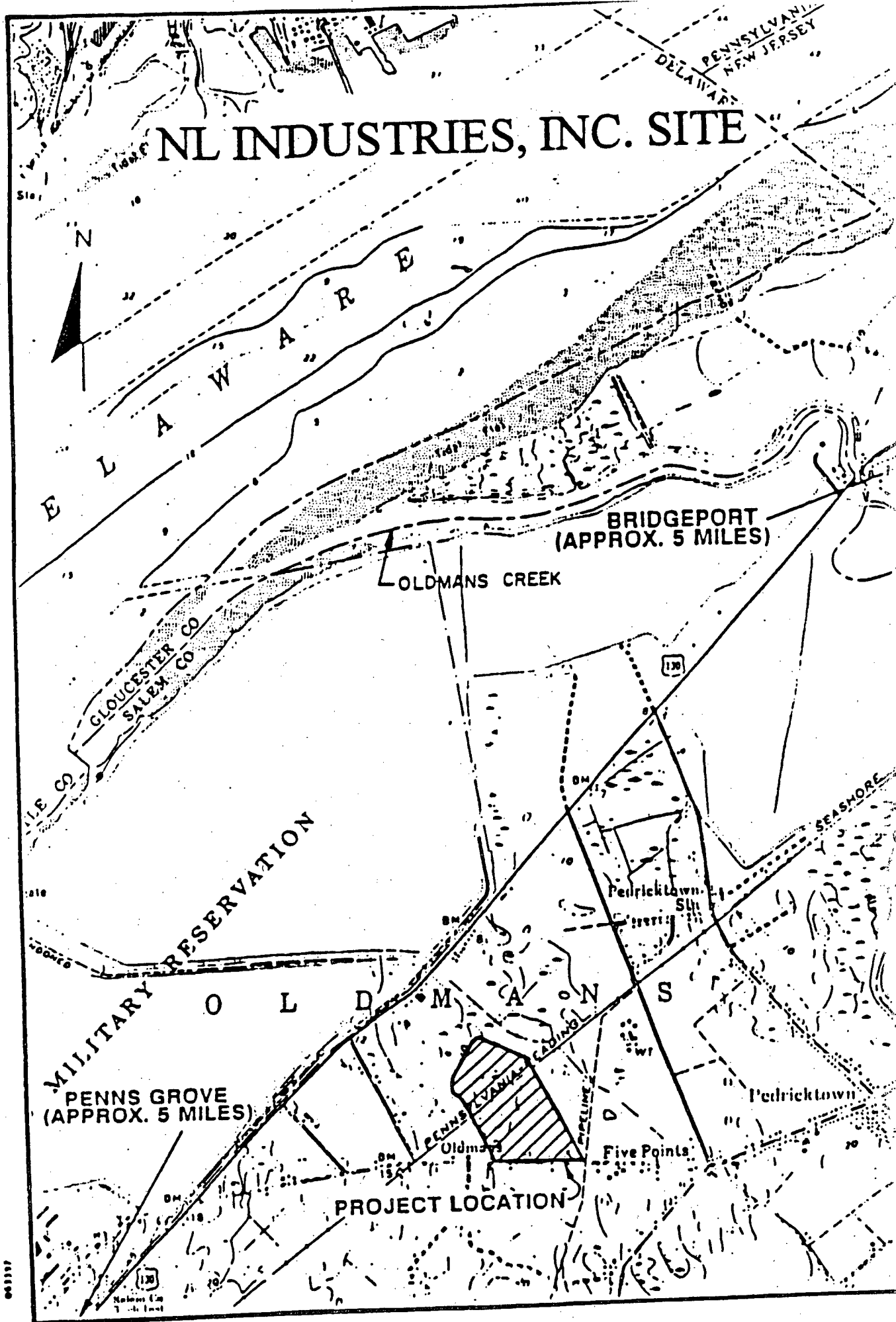
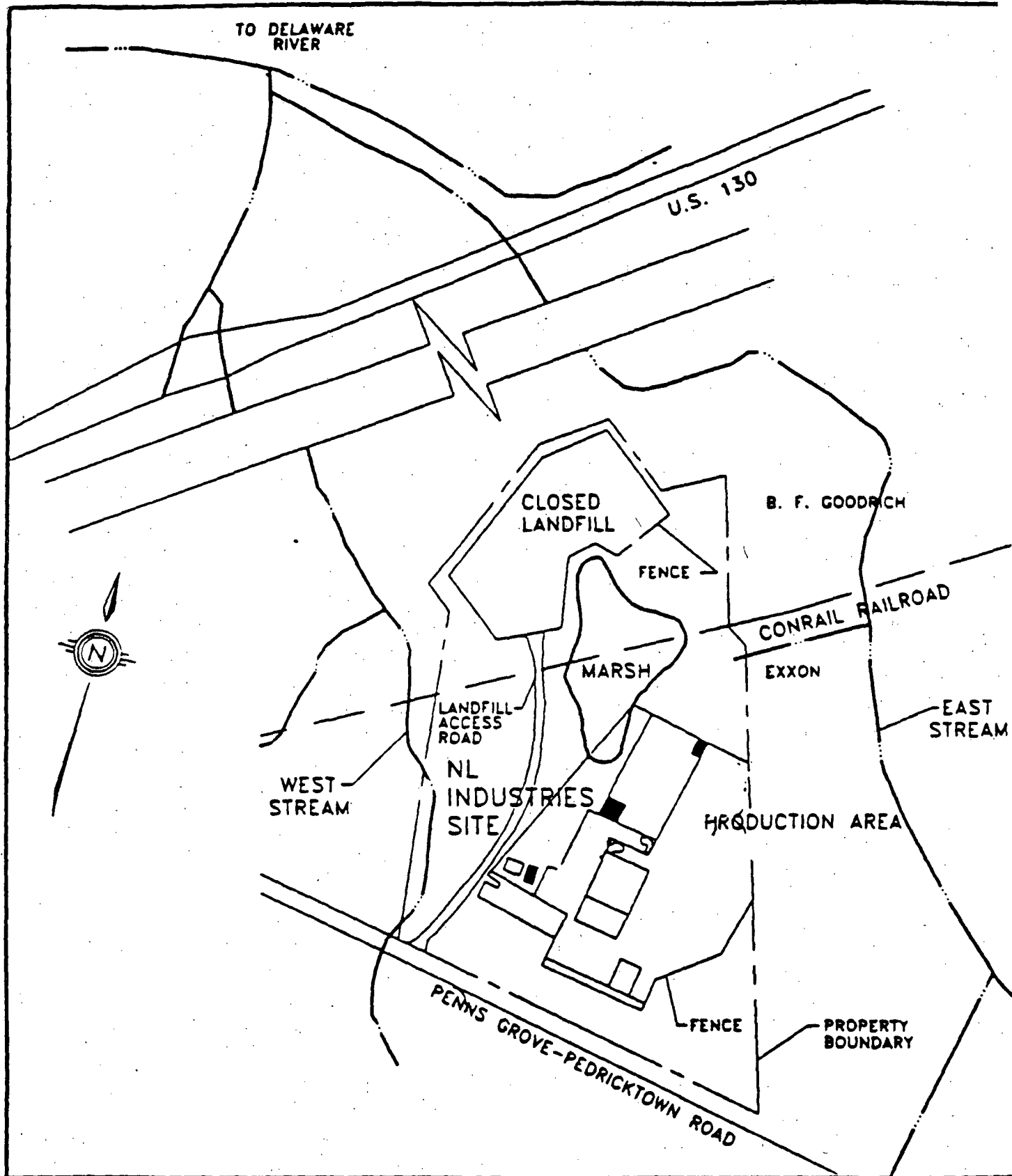


FIGURE 2



N.L. INDUSTRIES SITE LOCATION
NOT TO SCALE

APPENDIX D

SETTLING DEFENDANTS

LIST OF DEFENDANTS

AlliedSignal, Inc. (as Successor to Prestolite Batteries, Inc.)
c/o Pamela J. Cissak
AlliedSignal
PO Box 2245
101 Columbia Road
Morristown, NJ 07962

C & D Technologies, Inc.
c/o Seth v.d.h. Cooley
Duane, Morris & Heckscher
One Liberty Place
Philadelphia, PA 19103-7396

Exide Corporation
c/o Ari D. Levine
Exide Corporation
645 Penn Station
Reading, PA 1612-4205

GNB Technologies, Inc. (as Successor in Interest to Gould, Inc.)
c/o Susan M. Franzetti
Gardner, Carton & Douglas
Quaker Tower, Suite 3400
341 N. Clark Street
Chicago, IL 60610-4795

Johnson Controls, Inc.
c/o Dennis P. Reis
Quarles & Brady
411 East Wisconsin Ave.
Milwaukee, WI 53202

NL Industries, Inc.
c/o Marcus A. Martin
Bartlit, Beck, Herman, Palenchar & Scott
The Kitteridge Building
511 Sixteenth Street - Suite 700
Denver, CO 80202

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APPENDIX E

SEPTEMBER 15, 1995 ACTION MEMORANDA



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

200 BROADWAY

NEW YORK, NEW YORK 10007

ACTION MEMORANDUM

DATE: SEP 11 1995

SUBJECT: Request for a Ceiling Increase and an Increase in Scope at the National Lead Industries Site, Pedricktown, Salem County, New Jersey

FROM: W. Gad Tawadros, On-Scene Coordinator
Removal Action Branch

TO: Jeanne M. Fox
Regional Administrator

THRU: Kathleen C. Callahan, Director
Emergency and Remedial Response Division

Site ID-#: 61

I. PURPOSE

The purpose of this Action Memorandum is to request and document approval of the increase in scope and ceiling increase for the removal action (RV 5) described herein for the National Priorities List (NPL) National Lead (NL) Industries Site (Site), Pedricktown, Oldmans Township, Salem County, New Jersey, 08067. Previous funding authorized by the March 27, 1995 Action Memorandum established a total project ceiling of \$3,447,380, of which \$2,695,000 is for mitigation contracting.

The increase proposed in this memorandum is for \$2,499,000 of which \$1,900,000 is from the Regional removal allowance. This increase would raise the total project ceiling to \$5,946,000 (rounded) of which \$4,595,000 is from the Regional removal allowance.

Only \$300,000 is available in the current Advice of Allowance to finance this project, therefore, the scope of work will be implemented in phases following the assignment of funds from other year allocations.

The Site continues to meet the criteria for a removal action under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as described in Section 300.415 of the National Contingency Plan (NCP) and meets the consistency exemption for projects over \$2 Million. Since contamination remains in the areas described herein at levels above the remediation goal established for the Site, the action remains time critical in nature.

II. SITE CONDITIONS AND BACKGROUND

In 1990 the Salem County Mosquito Commission (SCMC) began widening and deepening that section of the West Stream (Stream) that crosses the Site to alleviate flooding and improve drainage in areas upstream of the Site. However, analytical data generated during the Remedial Investigation/Feasibility Study (RI/FS) indicated that sediment in the stream contained lead at levels in excess of 26,000 parts per million (ppm). The elevated levels of lead in the stream sediment were the result of the runoff from the smelting and disposal activities previously conducted at the Site. The SCMC activities were suspended at the request of the United States Environmental Protection Agency (EPA) pending the removal of the hazardous materials in the sediment of the Stream. Due to the threat which the contaminated stream sediment posed to the environment, the Site was referred to the Removal and Emergency Preparedness Program for CERCLA removal action consideration.

The Removal Action Branch (RAB) initiated a Removal Action to remove and dispose of the contaminated sediment on September 24, 1993. Approximately 7,000 cubic yards (CY) of contaminated sediment have been excavated and disposed of off-site.

The funding increase requested herein is necessary for the testing, excavation, staging and proper disposal of contaminated soil and sediment containing lead at levels above 500 ppm found in areas A, B and C of the Stream and associated flood plain (see Appendix A). The estimated volume, based on preliminary X-Ray Fluorescence Spectrometry results taken within 150 feet east of the Stream in area C and to the west of the Stream in area B, is at least 3,500 CY.

A Twelve Month Exemption was approved on January 29, 1991 and a \$2-Million Exemption was approved on August 10, 1994.

The category of this removal action is time critical and the Comprehensive Environmental Response, Compensation and Liability Information System number for this Site is NJD061843249.

A. Site Description

1. Removal site evaluation

The Site is an abandoned, secondary lead smelting facility. In 1972, NL Industries began operations at the Site by reclaiming and recycling lead from automotive batteries. Residual materials and the slag produced from the smelting process were disposed of in the on-site landfill. During its period of operation, NL was cited by the New Jersey Department of Environmental Protection (NJDEP) with various and repeated violations of the State air and water regulations. NL Industries ceased operations at the Site in approximately 1982. In 1983, NL sold the facility to National

Smelting of New Jersey, Inc. (NSNJ) and NSNJ commenced similar operations at the Site.

In 1984, NSNJ ceased operations and declared bankruptcy. Remaining on-site when operations terminated were four slag piles having an estimated volume of approximately 9,800 CY, 4,000 CY of contaminated debris, 25 tons of hazardous materials stored in the warehouse and approximately 900 CY of lead bearing raw materials in drums and containers in various locations throughout the Site. The containers, due to exposure to the elements, age and corrosion, posed a threat of release to the environment.

Time-critical removal actions have been undertaken at the Site since 1989. Actions taken as part of these removal actions included: fence repair, posting of warning signs, encapsulation of the slag piles, removal and disposal of deteriorated containers and removal of copper wiring.

In 1993 and 1994, a removal action was conducted which provided for the excavation and off-site disposal of contaminated Stream sediment. A preliminary survey conducted east of the Stream in area C and west of the Stream in area B as part of this removal action indicates that areas of soil containing lead in excess of the 500 ppm remediation goal exist. A complete survey is planned in the flood plains of areas A, B and C to define possible remaining areas of contamination.

2. Physical location

The Removal Action is taking place in the Stream and associated flood plain adjacent to the NL plant. The Stream drains surface run off from the NL plant and approximately one square mile of the adjacent countryside. It is also an intermittent tributary to the Delaware River which is approximately 1.5 miles north of the Site.

The Site is an abandoned secondary lead smelting facility situated on 46 acres of land on Pennsgrove-Pedricktown Road, Pedricktown, Salem County, New Jersey (see Figure 2).

The Site, which includes a closed permitted landfill under the jurisdiction of the NJDEP, overlies the Cape May Aquifer. The Stream borders and receives surface discharges from the Site. The nearest home is less than 500 feet from the Site and B.F. Goodrich, Martin Propane Gas Service, Pioneer Pallet Co., GBM Ball Bearing, ROD Shop, Wistar Equipment Co. and Corrosion Control Co. are active industrial neighboring facilities. Airco, Browning-Ferris and the Tomah Division of Exxon are inactive facilities in the area.

3. Site characteristics

The Site, an abandoned lead reclamation facility, operated from 1972 through 1984 processing automobile and industrial batteries. The lead contamination in the Stream resulted due to past operations conducted at the plant located on-site. During the facility's operational history, NL Industries was cited by the NJDEP on numerous occasions for violations of State air and water quality standards. As a result of the enforcement actions, NL Industries modified their process to comply with NJDEP regulations. NL Industries sold the facility to NSNJ in 1983.

NSNJ operated the facility from 1983 to 1984. In 1984 NSNJ ceased operations and filed for bankruptcy. The facility has been inactive since 1984. NL Industries, in an Order on Consent with the EPA effective on April 30, 1986, agreed to conduct an RI/FS. The RI and Final FS reports were approved on July 8, 1991 and in July 1993, respectively.

The Removal activity described herein is a continuation of the fifth removal action since the RAB's initial involvement at this Site. Details of the previous removal actions are contained in Section II.B of this Action Memorandum.

4. Release or threatened release into the environment of a hazardous substance, or pollutant, or contaminant

The Site is characterized by the presence of highly toxic metals in sediment and soil. The heavy metals identified at the Site include: lead, chromium, arsenic and cadmium. Each of these are designated hazardous substances under Section 101(14) of CERCLA, as listed in 40 CFR Table 302.4. Routes of exposure are inhalation, ingestion and skin or eye contact. Appendix A, Figure 5 is a Toxic Effects chart of the metals found on-site.

Flooding and subsequent erosion may have accelerated the release of heavy metal contaminated sediment and soil over time. Overflow of the stream may have deposited lead contaminated sediment on the banks of the Stream. Flooding of the Stream and erosion of the soil may have transported contaminated soil further downstream, affecting the water quality of the Delaware River.

5. NPL status

This Site was placed on the NPL in December 1982. The Operable Unit Two (OU2) remedial action has been on-going since November, 1992.

6. Maps, pictures and other graphic representations

The Site location map (Figure 1), a Site map (Figure 2), project maps (Figures 3 and 4) and a Toxic Effects chart (Figure 5) are included in Appendix A.

B. Other Actions to Date

1. Previous actions

To date, numerous government and private actions have been undertaken at the Site. The EPA has completed four removal actions and is nearing completion of the fifth. A brief description of each removal action is listed below.

Removal Action I - On December 19, 1988, funding was approved to conduct a removal action at the Site, consisting of repairs to the existing fence, installation of 900 feet of new chain link fence, the posting of warning signs and the temporary encapsulation of the slag piles to minimize airborne releases from the Site. The project started on January 9, 1989 and was completed on May 31, 1989, at a cost of \$77,555, of which \$43,005 was for mitigation contracting.

The newly installed section of fence isolated the facility from the landfill, but was not fully effective in limiting access by trespassers. The slag encapsulant degraded over time.

Removal Action II - This action was initiated on October 11, 1989 and consisted of inventorying the on-site hazardous and recyclable materials stored in deteriorating containers; upgrading building security including the installation of fence gates and locks on all building entrances; re-encapsulating the slag piles to prevent the releases of airborne particulates; constructing sand berms around the perimeter of the slag piles to prevent runoff from the Site caused by adverse weather conditions; and contacting potential recyclers for the raw materials stored on-site. Approximately 22 tons of raw material was recycled, while two tons of material was disposed of as hazardous.

In April 1990, after partial failure had occurred and potential release of the slag became imminent, the slag pile retaining bin walls were reinforced with timber. The reinforcement was designed to provide temporary support to prevent total collapse of the bin retaining walls and release of the slag to the environment.

This phase was completed on September 20, 1990 at a cost of \$376,010, of which \$227,660 was expended for mitigation contracting. The actions met the objectives stated in the Action Memorandum that was approved on September 12, 1989.

Removal Action III - A removal action to remove five tons of copper wire was initiated on November 17, 1990 to curtail the entry of trespassers. Other activities performed in this phase were the transfer and relocation of the contents of exterior stored steel and fiber drums that contained lead bearing waste to dry, sheltered on-site storage areas and the recycling of 2,200 steel drums. Relocation of the contaminated waste from the deteriorating containers was necessary to eliminate future discharges into the environment via airborne particulates and surface runoff.

Phase III was completed on July 25, 1991 at a cost of \$186,720, of which \$135,280 was for mitigation contracting.

Removal Action IV - Following the approval of an Action Memorandum on June 1, 1992, removal activities were initiated on June 18, 1992, consisting of the replacement of damaged wood shoring to two slag bin retaining walls, the repair of the perimeter fence and building gates damaged by vandals and the upgrading of the slag pile berms to control runoff.

Phase IV was completed on June 26, 1992, at a cost of \$45,715, of which \$44,155 was for mitigation contracting.

2. Current actions

An Action Memorandum for \$1,237,700 of which \$934,100 was for mitigation contracting was approved on July 15, 1993. Consistent with this Action Memorandum and upon completion of the on-site treatment and disposal of slag by the potentially responsible parties (PRPs), a removal action was initiated on September 24, 1993, which included the excavation, staging, testing and disposal of contaminated stream sediment. The SCMC provided an access road for the length of the stream widening project by removing all surface vegetation.

Bad weather caused temporary stoppage of the project in February 1994. Work resumed on July 25, 1994 and stopped again on August 24, 1994 due to inclement weather conditions. Removal work resumed on September 26, 1994.

An increase associated with the activities funded in the July 15, 1993 Action Memorandum of \$904,480 of which \$611,700 was for mitigation contracting was approved on August 10, 1994. An additional increase of \$562,000 of which \$400,000 was for mitigation contracting was approved on March 27, 1995. This funding increase is requested to accommodate removal activities associated with an increase in volume estimates for contaminated soil and sediment at the Site.

Operable Unit One remedial response activities to be conducted at the Site include the extraction and treatment of contaminated groundwater and the excavation, on-site treatment and disposal of contaminated soil and sediment in an on-site landfill.

C. State and Local Authorities' Roles

1. State and local actions to date

In 1986, the NJDEP Division of Hazardous Waste Management transferred Site responsibility to the EPA to initiate safety measures as part of a long-term CERCLA Site cleanup. This is an EPA lead site and there are no State or local actions taking place at the Site. State and local officials are routinely updated regarding on-going activities and accomplishments.

2. Potential or continued State/local response

Since EPA has the lead at this site, State and local organizations will act in a supporting role during this removal action.

III. THREATS TO PUBLIC HEALTH, OR WELFARE, OR THE ENVIRONMENT AND STATUTORY AND REGULATORY AUTHORITIES

The following criteria from Section 300.415(b)(2) of the NCP are directly applicable to the threats that exist at the NL Site:

- (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;
- (ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;
- (iv) High levels of hazardous substances or pollutants or contaminants in soil largely at or near the surface, that may migrate;
- (v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; and
- (vii) The lack of availability of other appropriate federal or state response mechanisms to respond to a release.

A. Threats to Public Health and Welfare

The Agency for Toxic Substances and Disease Registry (ATSDR) Health Assessment for the Site confirms that possible human and animal exposures at the Site include: ingestion, direct contact with groundwater/surface water and soil, possible ingestion of bioaccumulated contaminants in the food chain and inhalation of entrained contaminants (See Toxic Effects Chart, Figure 5).

The results of samples collected at the Site during December 1994 and January 1995 indicate that lead contamination continues to exist on site above the 500 ppm goal established for the Site, therefore the Site continues to be a health threat as described by the ATSDR Health Consult for the Site.

B. Threats to the Environment

Runoff from contaminated soil may enter the Stream in concentrations detrimental to the environment. During periods of heavy rainfall, lead contamination could be washed into the Delaware River potentially impacting the food chain. Additional threats to the environment posed by the Site are documented in the 1993 Ecological Risk Assessment.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. EXEMPTION FROM STATUTORY LIMITS

Section 104(c)(1) of CERCLA, limits a Federal removal action to a \$2 Million site ceiling and a 1 year duration. One of the criteria which must be met to obtain exemptions from these limits is called the "consistency exemption" which is discussed below.

A. Consistency Exemption

1. Continued response actions are otherwise appropriate and consistent with the remedial action to be taken.

Removing contaminated soil and sediment from the Stream and flood plain is consistent with the selected remedial actions to address the soil and groundwater contamination at the Site. This removal action is appropriate and necessary to prevent further contamination of the Stream and to eliminate the danger to the public health, welfare or the environment presented by the contaminated soil.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed action description

The first phase of the proposed work will consist of sampling of the Stream and associated flood plain in areas A, B, and C (see Appendix A) to delineate the extent of soil contaminated with lead above the 500 ppm cleanup level, as well as implementation of

alternative actions, as necessary, to reduce runoff east of the Stream in area B and from the tributaries to area C from the landfill.

The remaining phases of the work will consist of removing and disposing of the remaining lead contaminated soil from areas A, B and C to meet the cleanup level of 500 ppm lead. The depth of excavation is estimated to range from 6 to 36 inches depending on the extent of contamination of the Stream, its banks and flood plain. The volume is currently estimated to be a minimum of 3,500 CY. Confirmatory sampling will be conducted to assure that the 500 ppm cleanup level is met. The impacted banks and flood plain will be backfilled and graded, if necessary.

2. Contribution to remedial performance

The implementation of this removal action will contribute to the overall remediation of the Site by eliminating the threat to public health and the environment posed by the hazardous substances in the Site's soil and Stream sediment. The proposed actions are consistent with the long-term cleanup for the Site.

3. Description of alternative technologies

Alternative technologies considered were stabilization, solidification and soil washing/flushing. The most cost effective method was determined to be stabilization with kiln dust and landfilling.

4. EE/CA

Due to the time-critical nature of this removal action, an EE/CA will not be prepared.

5. Applicable or relevant and appropriate requirements (ARARS)

ARARS that are within the scope of this removal action, which pertain to the transportation and disposal of hazardous waste, will be met to the extent practicable. The federal ARARS determined to be applicable for this removal action include the Resource Conservation and Recovery Act and the Clean Water Act.

6. Project Schedule

The removal action is ongoing. Sampling, excavation, staging, stabilization and disposal of the remaining lead contaminated soil and sediment from areas A, B and C in a subtitle C RCRA landfill can be completed within four months, provided favorable weather conditions prevail. Disposal, decontamination and demobilization of equipment will follow and complete the removal action at this Site.

B. Estimated Costs

	Previous Project Ceiling	Proposed Fund Increase	Proposed Project Ceiling
ERCS Cost Incl. 20%	2,695,000	1,900,000	4,595,000
TAT	356,455	200,000	556,455
CONTINGENCY 15%	14,035	315,000	329,035
EPA	381,890	84,000	465,890
TOTAL (Rounded)	3,447,380	2,499,000	5,946,000

VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will continue to contribute to the health risk to anyone coming in contact with the contaminated soil or runoff.

VIII. OUTSTANDING POLICY ISSUES

At the present time there are no outstanding policy issues.

IX. ENFORCEMENT

EPA issued notice letters to approximately 70 PRPs notifying them of their potential CERCLA liabilities. EPA is continuing to work with the PRPs to resolve liability issues. EPA does not anticipate initiating discussions with the PRPs to determine whether the PRPs can and will perform the removal activities outlined in this Action Memorandum since the activities outlined herein will be a continuation of EPA's ongoing removal activities at the Site.

X. RECOMMENDATION

This decision document represents the selected removal action for the NL Industries Site, Pedricktown, New Jersey, developed in accordance with CERCLA, as amended, and not inconsistent with the NCP. This decision is based on the administrative record for the Site.

Conditions at the Site continue to meet the NCP Section 30.415(b)(2) criteria for a removal and I recommend your approval of the proposed increase in scope and a ceiling increase of \$2,499,000 of which \$1,900,000 will be funded from the Regional removal allowance. The total project ceiling, if approved, will be \$5,946,000, of which \$4,595,000 is for mitigation contracting.

Only \$300,000 is available in the current Advice of Allowance to finance this project, therefore, the scope of work will be implemented in phases following the assignment of funds from other year allocations. Considering that this removal action is of a time-critical nature, the implementation of the first phase of the scope of work with currently available funds will permit the remaining work to be implemented in an expeditious fashion once additional funds are allocated.

Please indicate your approval and authorization of funding for these continuing removal actions at the NL Industries Site, per current delegation(s) of authority by signing below.

APPROVAL :


Jeanne M. Fox,
Regional Administrator

DATE:

9/15/85

DISAPPROVAL:

Jeanne M. Fox,
Regional Administrator

DATE:

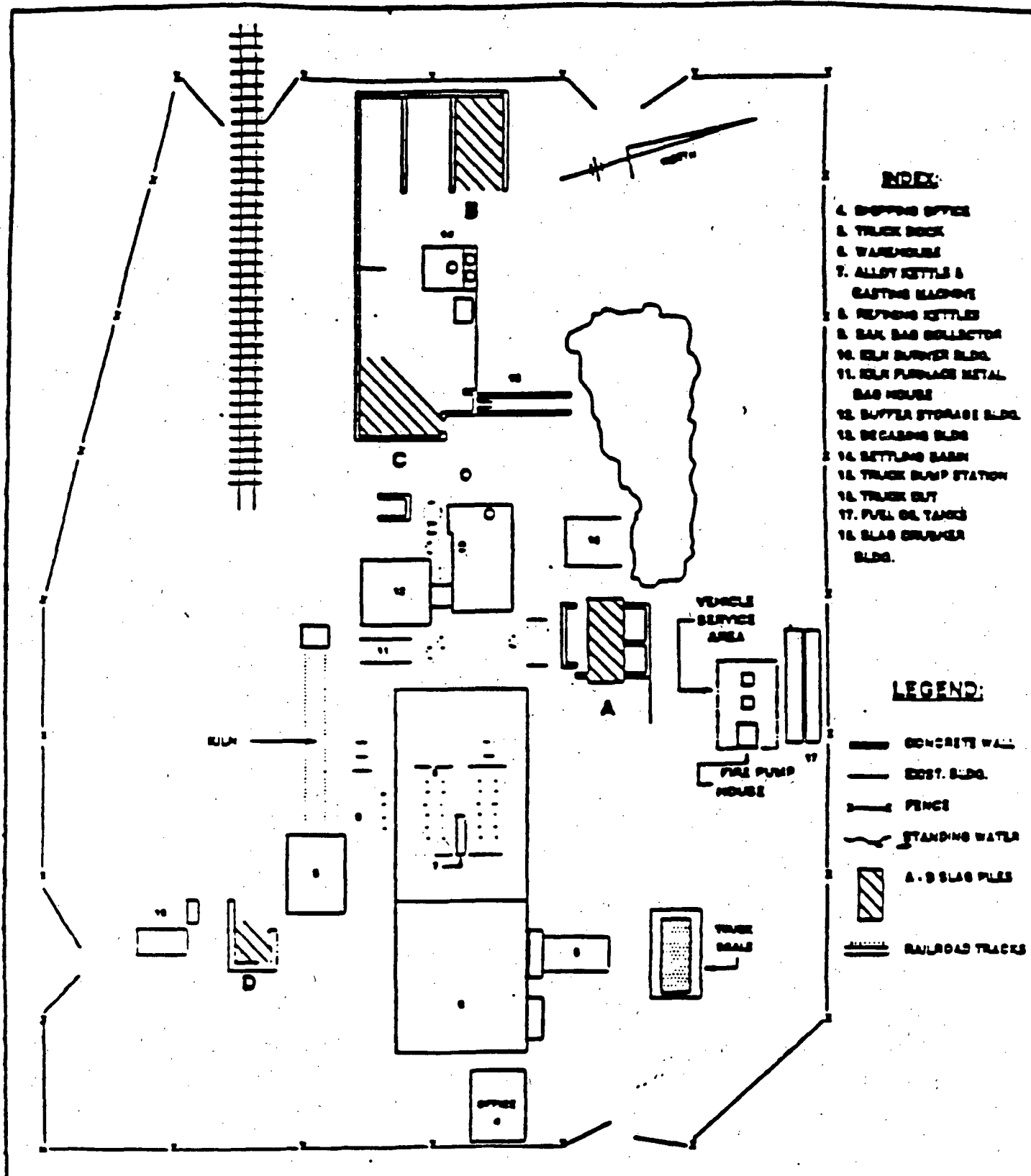
cc:(after approval is obtained) .

K. Callahan, ERRD-D
R. Salkie, ERRD-ADREPP
J. Frisco, ERRD-DDNJP
G. Zachos, ERRD-RAB
J. Witkowski, ERRD-RAB
E. Dominach, ERRD-RAB
C. Moyik, ERRD-PS
M. Randol, EPD
D. Karlen, ORC-NJSUP
R. Gherardi, OPM-FIN
D. Dietrich, 5202G
T. Eby, 5202G
S. Boyle, NJDEP
K. Delaney, NJDEP
M. Pederson, NJDEP
J. Smolenski, NJDEP
C. Kelley, TATL
S. Murphy, OPM-FAM

APPENDIX A

Maps





WESTON
MANAGERS DESIGNERS CONSULTANTS

Roy F. Warren, Inc.
MAJOR PROGRAMS DIVISION

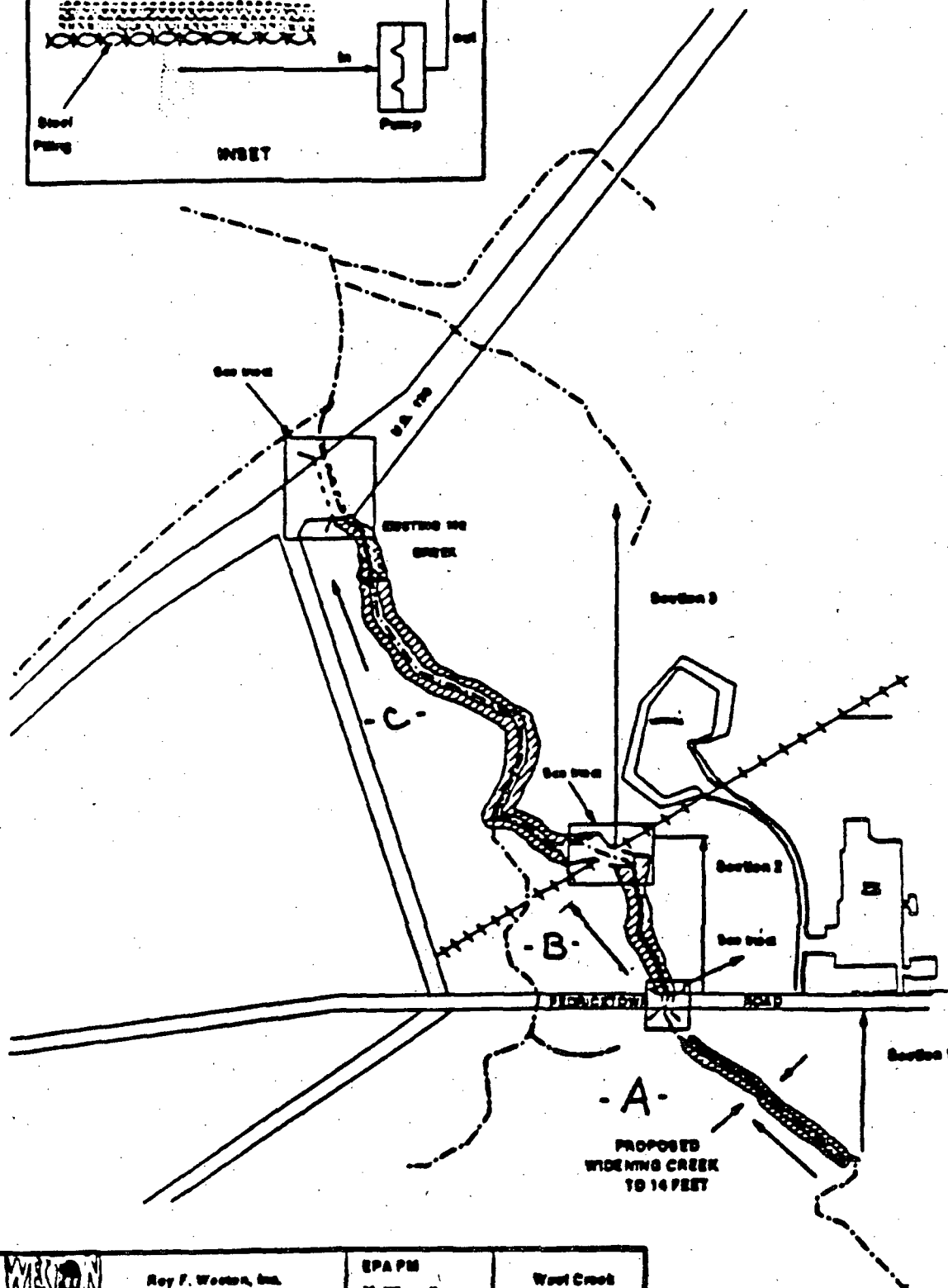
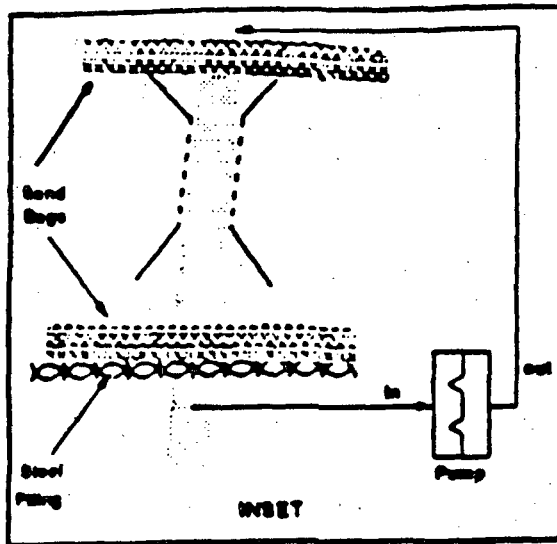
EPA PM
E. Dominach

NL Industries
Site Map

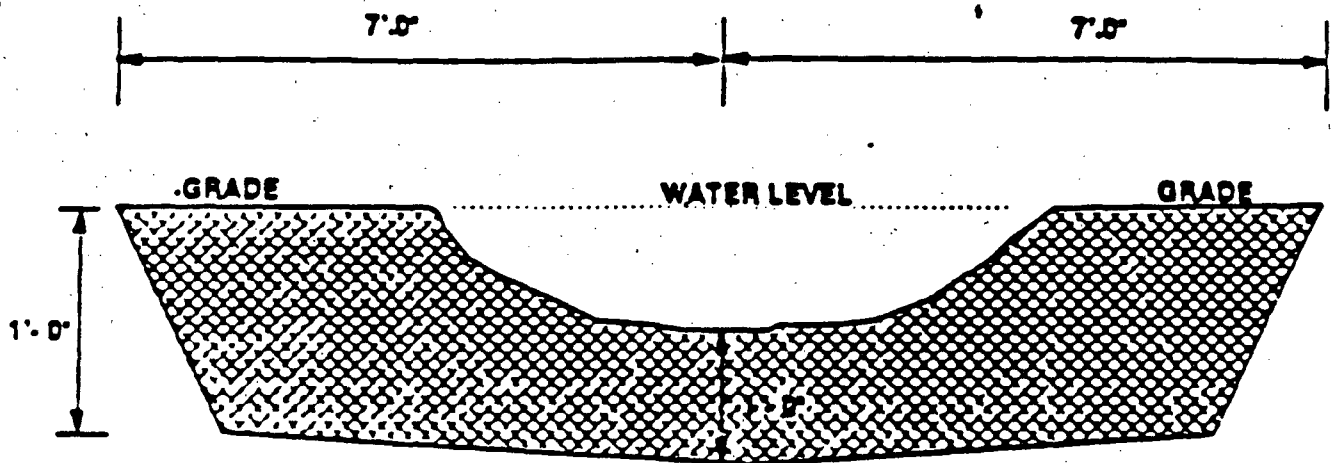
IN ASSOCIATION WITH FOSTER WHEELER CORP.,
C C JOHNSON & MALHOTRA, P.C., RESOURCE
APPLICATIONS, INC. AND R.E. SARRIERA ASSOCIATES

TAT PM
J. Manfreda

Figure 2



	Roy F. Weston, Inc. MAJOR PROGRAMS DIVISION IN ASSOCIATION WITH POSTER WHEELER CORP. P.O. BOX 60000, BALTIMORE, P.D. RESOURCE	EPA PM M. Wiggles YAT PM	West Creek CO. INDUSTRIES Figure 3
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**CROSS SECTION OF
WIDENING PROJECT
FOR ENTIRE LENGTH CREEK**

DWN BY JLN
DATE 08-03-83
DWN NL-C



Roy F. Weston, Inc.
MAJOR PROGRAMS DIVISION

EPAPM

M. Wiggett

West Creek
NL INDUSTRIES

IN ASSOCIATION WITH FOSTER WHEELER CORP.,
C.C. JOHNSON & MALHOTRA, P.C., RESOURCE
APPLICATIONS, INC. AND R.E. BARRIERA ASSOCIATES

TAT PM

E.G. Dominech

Figure 4

**SUMMARY OF POTENTIAL TOXICOLOGICAL EFFECTS OF
SOME OF THE IDENTIFIED HAZARDOUS CHEMICALS AT:**

**NL INDUSTRIES
PEDRICKTOWN, NEW JERSEY**

	CARCINOGEN	MUTAGEN	TERATOGEN	TOXIC BY INHALATION, INGESTION OR DERMAL CONTACT	CENTRAL NERVOUS SYSTEM DAMAGE	LIVER DAMAGE	CARDIOVASCULAR SYSTEM DAMAGE	LUNG DAMAGE	KIDNEY DAMAGE	LYMPHATIC SYSTEM DAMAGE	EYE, SKIN, RESPIRATORY & MUCOUS MEMBRANE IRRITANT
ANTIMONY				●			●				●
ARSENIC	●			●		●		●	●	●	●
BARIUM				●	●						●
BERYLLIUM	●			●				●			●
CADMIUM	●			●					●		●
CHROMIUM				●							●
COBALT				●							●
COPPER				●							●
CYANIDE				●	●		●	●	●		●
LEAD				●	●						●
MAGNESIUM				●							●
MANGANESE				●	●				●		●
MERCURY				●	●				●		●
NICKEL	●			●				●			●
SELENIUM				●		●			●		●
THALLIUM				●	●	●		●	●		●
VANADIUM				●							●
ZINC				●							●

OWN BY: DB
REVISED: 12-21-90
DAN 678883



Roy F. Weston, Inc.
MAJOR PROGRAMS DIVISION

EPA PM

E. Dominach

TOXIC EFFECTS
CHART

IN ASSOCIATION WITH FOSTER WHEELER CORP.
C. C. JOHNSON & VALMOTRA, P.C. RESOURCE
APPLICATIONS INC AND RE SARR, EPA ASSOCIATES

TAT PM

J. Manfreda

Figure 5